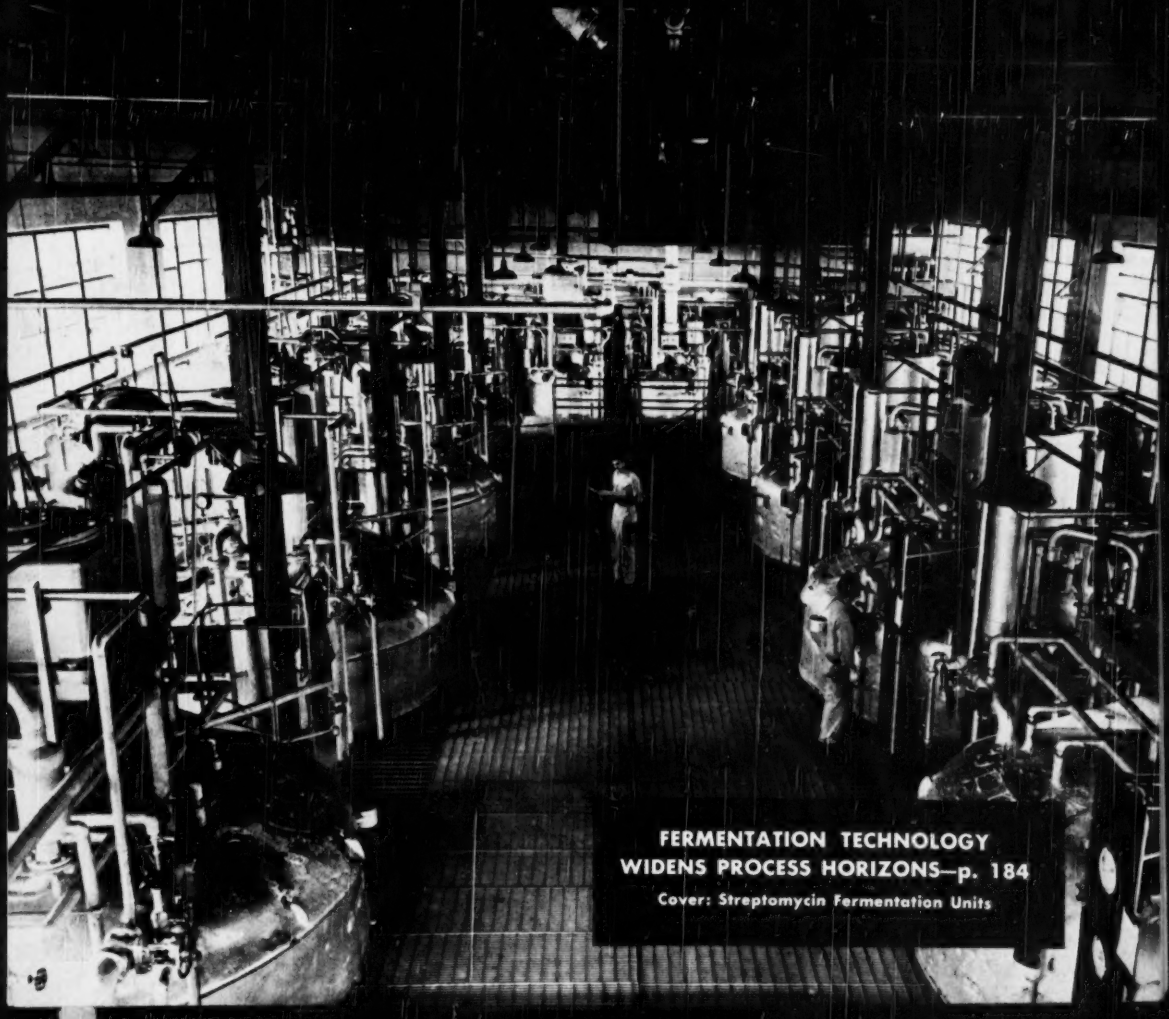
bruary 1950

# Chemical Industries

Including CHEMICAL SPECIALTIES

IN THIS ISSUE

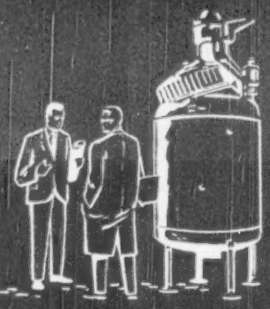

*Glycol Capacity Upped* 175
*Food from Algae* 181
*Antibiotics Spur Fermentation Revival* 184
*Patent Licensing* 189
*Insulation of Outdoor Plants* 190
*Close Control Cuts Inventory Losses* 192
*CI REPORT: Germans Boost Output of Chemicals* 195
*How to Launch Household Chemical Specialties* 212
*Carnauba Study Provides Buying and Use Data* 216

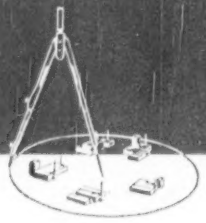
**FERMENTATION TECHNOLOGY WIDENS PROCESS HORIZONS—p. 184**

Cover: Streptomycin Fermentation Units

# EXTRAS···



## ···AT NO EXTRA COST



*when you specify*

# SOLVAY

**Supplying chemicals** to American industry means more than meeting specifications at a price.

**With Solvay** . . . it means prompt, *dependable* delivery from coast-to-coast warehouse stocks . . . a continuing supply from five big plants situated in America's industrial centers.

**. . . It means** an all-inclusive *working* knowledge of alkalies, the result of sixty-nine years of experience. And Solvay's "Industry-Wise" Technical Service offers a specialized service that is exclusive with Solvay—a corps of experts who know *your* particular industry.

**These "extras"**—"extras" that cannot be shown in a specification, or found on a price list—are yours at no extra cost when you deal with America's leading manufacturer of alkalies. Next time you order alkalies and associated chemicals . . . specify Solvay.

**SOLVAY SALES DIVISION**

ALLIED CHEMICAL & DYE CORPORATION

**40 Rector Street, New York 6, N.Y.**

Boston • Charlotte • Chicago • Cincinnati • Cleveland • Detroit • Houston
New Orleans • New York • Philadelphia • Pittsburgh • St. Louis • Syracuse

SOLVAY
PRODUCTS

Soda Ash • Caustic Soda • Caustic Potash • Chlorine • Potassium Carbonate • Nytron • Calcium Chloride
Sodium Bicarbonate • Specialty Cleansers • Ammonium Bicarbonate • Sodium Nitrite • Para-dichlorobenzene
Ortho-dichlorobenzene • Monochlorobenzene • Methanol • Ammonium Chloride • Formaldehyde

One dependable source
for your complete needs on
alkalis & solvents
CAUSTIC POTASH
Liquid 45-50%, Flake and Solid 88-92%
CAUSTIC SODA
Liquid 50% Standard and Rayon Grades
Liquid 70-73% • Standard Grade Flake and Solid
SODA ASH
CARBON BISULFIDE
CARBON TETRACHLORIDE
ETHYLENE DIBROMIDE
SULFUR MONOCHLORIDE
TRICHLORETHYLENE
phosphates
ACID SODIUM PYROPHOSPHATE
DISODIUM PHOSPHATE
MONOSODIUM PHOSPHATE
SODIUM TRIPOLYPHOSPHATE
TETRAPOTASSIUM PYROPHOSPHATE
TETRASODIUM PYROPHOSPHATE
MONOPOTASSIUM PHOSPHATE
DIPOTASSIUM PHOSPHATE
TRIPOTASSIUM PHOSPHATE
PHOSPHORIC ACID 75%
TETRASODIUM PYROPHOSPHATE CRYSTALS
magnesium chemicals
MAGNESIUM OXIDE — Various Grades
MAGNESITE, Crude Mined
MAGNESIUM SULFATE, (Epsom Salt)
MAGNESOL*
barium chemicals
BARIUM HYDROXIDE
BARIUM NITRATE
BARIUM OXIDE
BARIUM PEROXIDE
BLANC FIXE, (Barium Sulfate)
BLANC FIXE PULP
Westvaco
CHEMICALS
TRADE-MARK
Complete List of Other Westvaco Chemicals and Specialty Products Sent on Request.
WESTVACO CHEMICAL DIVISION
FOOD MACHINERY AND CHEMICAL CORPORATION
GENERAL OFFICES • 405 LEXINGTON AVENUE, NEW YORK 17
CHICAGO, ILL. • CLEVELAND, OHIO • CINCINNATI, OHIO
ST. LOUIS, MO. • LOS ANGELES, CALIF. • NEWARK, CALIF.
fmc
*MAGNESOL is the registered trade mark of Food Machinery and Chemical Corporation for its magnesium silicate adsorptive powder

# NOW...You Can Get

# SULPHUR

# from MATHIESON

Another essential chemical is available from Mathieson. With the acquisition of the Southern Acid and Sulphur Company, Mathieson becomes one of the major processors of refined sulphur. Our strategically located sales offices will be pleased to discuss your requirements.

## Forms of Sulphur Available

**AGRICULTURAL GRADES**

Dusting—Conditioned
Unconditioned
Soil—16 Mesh
Wettable—Dipping

**INDUSTRIAL GRADES**

Commercial Flour
Refined Flour U.S.P.—Light
Refined Flour U.S.P.—Heavy
Refined Broken Rock
Refined Roll Brimstone (Stick)
Flowers of Sulphur U.S.P.
Rubbermakers—Refined & Commercial
All grades including oil treated.

**Mathieson Chemical Corp., Mathieson Bldg., Baltimore 3, Md.**

District Sales Offices

60 East 42nd Street, New York 17, N.Y.

Liberty Life Bldg.
Charlotte 2, N. C.

410 N. Michigan Ave.
Chicago 11, Ill.

Dixie Terminal Bldg.
Cincinnati 2, Ohio

Gulf Building
Houston 2, Texas

Queen & Crescent Bldg.
New Orleans 12, La.

Widener Bldg.
Philadelphia 7, Pa.

Hospital Trust Bldg.
Providence 3, R. I.

Rialto Building
St. Louis 2, Missouri

Sulphur . . . Caustic Soda . . . Soda Ash . . . Bicarbonate of Soda . . . Liquid Chlorine
Chlorine Dioxide . . . Ammonia, Anhydrous & Aqua . . . HTH Products . . . Dry Ice
Carbonic Gas . . . Sodium Chlorite Products . . . Sodium Methylate . . . Sulphuric Acid

# Chemical Industries

Including CHEMICAL SPECIALTIES

Vol. 66, No. 2

FEBRUARY 1950

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES


*What's new*


| | | | |
|---|---|---|---|
| Glycol Capacity Rising 50% | 175 | New Insecticides Tested | 179 |
| Antibiotic Aids Canning | 176 | Rubber Plant Disposal Looms | 180 |
| Glycerine Market Tight | 177 | Algae Promising Food Source | 181 |
| Blaw-Knox's Petrochemicals | 177 | QMC Tests Synthetic Tan | 182 |
| Floor Wax Battle Joined | 178 | Radioisotope Aids Spraying | 182 |
| Pentosan Acetate Films | 178 | Changes Proposed to Pulpers | 183 |

## FEATURES

| | | |
|---|---|---|
| Antibiotics Pace Industrial Fermentation Revival | *by R. D. Petty* | 184 |
| Licensing Patents For Profits | *by John H. Wills* | 189 |
| How Koppers-Pittsburgh Solved Its Outdoor Insulation Problems | *by Marshall Allen* | 190 |
| Inventories Are Everybody's Job | *by V. R. Bechtel* | 192 |
| CI Report: Germany's Chemical Recovery | *by James V. Brennan* | 195 |

## CHEMICAL SPECIALTIES

| | | |
|---|---|---|
| How to Launch a Household Specialty | *by Charles Dupuy* | 212 |
| Latest Carnuba Wax Study | *by Charles J. Marsel* | 216 |
| Specialties News | 220 | |
| New Chemical Specialties | | 231 |

## EVERY MONTH

| | | | |
|---|---|---|---|
| The Reader Writes | 158 | Laboratory Notebook | 268 |
| Newsletter | 169 | Industry's Bookshelf | 270 |
| The Chemical Panorama | 208 | Booklets and Catalogs | 275 |
| New Products and Processes | 244 | General News | 279 |
| New Equipment | 250 | Chemical Markets | 286 |
| Packaging and Shipping | 256 | Index to Advertisers | 296 |
| Plant Notebook | 264 | From Where We Sit | 298 |

Patents and Trademarks 301



Chemical Industries is indexed regularly by Engineering Index, Inc., and Industrial Arts Index.

*Cover: Merck & Co., Inc.*

ABP ABC

EDITOR: R. L. Taylor; BUSINESS MANAGER: W. A. Jordan

PUBLICATION STAFF: Managing Editor, Howard C. E. Johnson; Associate Editor, Herman W. Zabel; Assistant Editor, John J. Craig; Editorial Assistant, Barbara M. Bissell; Contributing Editors, T. Pat Callahan, Randall D. Sheeline; Production Manager, Olga E. Varesm. CONSULTING EDITORS: Robert T. Baldwin, Lawrence W. Bass, Benjamin T. Brooks, J. V. N. Dorr, Charles R. Downs, Ernest W. Reid, Norman A. Shepard. BUSINESS STAFF: New York, L. C. Todaro, Wm. B. Hannum, Jr., Richard F. Burkhart; Chicago, Frank C. Mahnke, Jr.; Los Angeles, Don Harway; Circulation Manager, Florence Sanders.

Published monthly at 1309 Noble St., Philadelphia 23, Pa., and entered as 2nd class matter July 15, 1944, at the Post Office at Philadelphia 4, Pa., under the Act of March 3, 1879. Subscription rates U. S. A. and Canada $5.00 a year, $8.00 two years, $10.00 three years. (Canadian subscriptions and remittances may be sent in Canadian funds to Chemical Industries, P. O. Box 100, Terminal A, Toronto, Canada.) Latin America add $2.00 per year for postage. Other foreign countries $15.00 one year, $30.00 three years.


Copyrighted 1949 by MACLEAN-HUNTER Publishing Corporation, 522 Fifth Avenue, New York 18, N. Y. MUrray Hill 2-7888. Horace T. Hunter, President; E. R. Gauley, Vice-President; J. L. Frazier, Secretary.


OFFICE OF PUBLICATION: 1309 Noble Street, Philadelphia 23, Pa. EDITORIAL & EXECUTIVE OFFICES: 522 Fifth Ave., New York 18, MUrray Hill 2-7888. DISTRICT OFFICES: Chicago: 309 West Jackson Boulevard, Chicago 6, Ill., HArrison 7-7890. Los Angeles: 1709 W. 8th St., Los Angeles 14, Calif., DUnkirk 2-8576. London: Sun Life of Canada Bldg., Trafalgar Square, London, S. W. 1, England.

A MACLEAN-HUNTER publication, Horace T. Hunter, President

Plasticizer OF THE MONTH

HARFLEX 500*

Appearance: Light Yellow Liquid

Specific Gravity: 0.931 @ 20/20° C

Acidity: 0.1% max., calc. as Acetic Acid

Fire Point: 485° F.

Viscosity: 57 seconds, Saybolt at 100° F.

Weight: 7.76 lbs. per gallon

USES

HARFLEX 500 is highly recommended for use with vinyl chloride-type resins. It combines high efficiency and superior cold flex resistance with excellent processing characteristics, ageing qualities, heat resistance, and water resistance, in one plasticizer at low cost.

* Pat. Pending

HARCHEM

PLASTICIZERS

DICAPRYL SEBACATE
DICAPRYL ADIPATE
DICAPRYL PHTHALATE
DIBUTYL SEBACATE
DI-ISO-OCTYL SEBACATE
DI-ISO-OCTYL ADIPATE
DI-ISO-OCTYL PHTHALATE
DIBENZYL SEBACATE
DIHEXYL SEBACATE
DIHEXYL ADIPATE
DIHEXYL PHTHALATE
DIMETHYL SEBACATE
BUTYL BENZYL SEBACATE
CAPRYL BENZYL SEBACATE

HARDESTY CHEMICAL CO., INC.
41 East Forty-second St. New York 17, N.Y.

# THE READER WRITES

### *Chlor-Alkali History Addenda*

*To the Editor of Chemical Industries:*

Your readers will recall the excellent CI report on Diaphragm vs. Amalgam Cells by Robert B. Macmullin, in CHEMICAL INDUSTRIES of July 1947. The historical aspects were more fully covered by R. L. Murray, *Ind. & Eng. Chem.* 41; 2155 (1949), and L. D. Vorce, *Trans. Elchem. Soc.* 86; 69 (1944), but like all histories they lack a few of the facts, and more particularly the view-point of contemporary witnesses.

A story beginning nearly fifty years ago might well be put on record before all of the electrolytic chlorine pioneers have gone on. Trivial events sometimes have long-delayed repercussions, names may be omitted, or forgotten, and relative importance may have been quite different at the time things happened.

In early 1904, a young American student at Karlsruhe, Germany, was invited by Prof. Max LeBlanc, to assist him in his investigation of mercury cathode electrolytic alkali cells. An operating, lecture-room model of the Castner mercury cell was wanted. On this small scale, the decomposition of the amalgam was never satisfactorily accomplished until this American student devised a local electrolytic couple, made of graphite plates, for this purpose. The great surprise was that, short of complete saturation, there was no limit to the concentration of the caustic soda solution produced in the cell.

Prof. Fritz Haber was so intrigued by the operation of the cell that this American student was invited to exhibit it and to deliver a lecture on mercury cells to about 150 of his students. It could be that the 50% caustic mercury cell originated in the mind of an American before World War I and not from German sources after World War II, as has been frequently stated in recent literature. For documentary confirmation, see U. S. Pat. #908,545 of Jan. 5, 1909, by C. F. Carrier, Jr. The time, however, was not yet ripe for any substantial expansion of mercury cells in the American electrolytic alkali industry.

The great development of diaphragm cells followed only after the discovery of a great fundamental principle by Ernest A. LeSueur. In his U. S. Pat. #518,040 of April 10, 1894, he clearly disclosed the necessity of electrolyte flow from the anode toward the cathode, not in the opposite direction. No diaphragm cell is capable of economic opération which ignores this principle. The McDonald and Allen-Moore cells were refinements based on operating experience with LeSueur cells, and no better device has ever been discovered for minimizing the detrimental action of free caustic in the anode compartment.

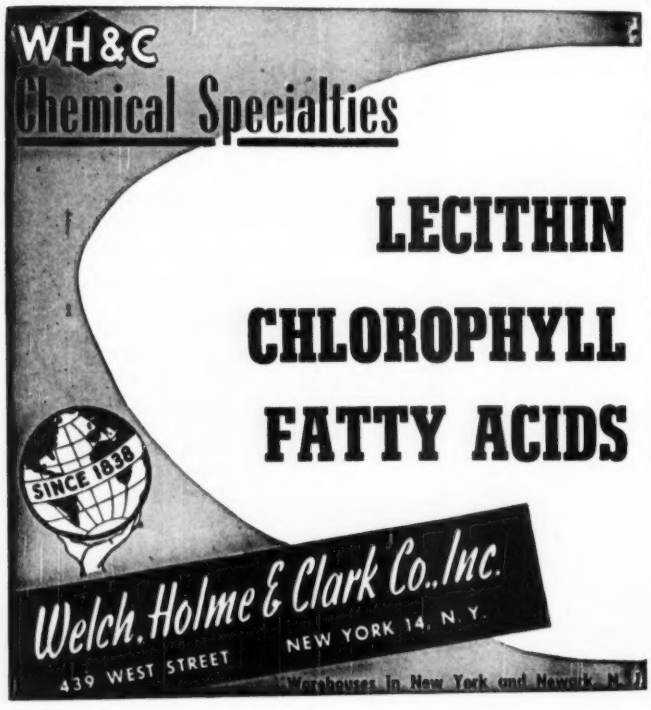
The Warner Chemical Co., Carteret, N. J., installed McDonald cells operated by steam-electric power about 1905. In 1908, Dr. Lucien C. Warner wished to expand the caustic soda capacity of his company, but before so doing he decided to operate a commercial size pilot unit of both mercury cathode and improved diaphragm types. The company chemist, Harry R. Nelson, greatly improved the McDonald cell, and the writer was specially engaged to build and operate a mercury cell of his own design which had already proved to produce pure caustic soda solution of unusually high concentration. After a year of plant scale research, it was decided that under American industrial conditions at that time the diaphragm type cell was economically preferable to the mercury cathode type.

In 1915, another industrial pioneer, Ernest C. Klipstein, joined with Dr. Warner in the Warner-Klipstein Chemical Co. To the courage and business foresight of this partnership, the electrolytic alkali industry owes a real debt. At this time, electrolytic caustic soda had only been made by hydro-electric power, or as an adjunct to some larger industry, but now two men were willing to "bet a million" that a caustic soda and chlorine plant could stand on its own feet and be located on the basis of cheaper fuel and not at the source of hydro-electric power. They won, and to work under such leaders was a privilege.

The name of Nelson appears to be fading from history along with the cell which bears his name, in spite of the fact that shortly after the end of World War I there were more Nelson cells in operation in the world than any other type. The idea of an impregnated, graphite anode may not have originated solely with Nelson, but he had no small part in making it standard practice in the field. An illustrated description of the Nelson cell, by the writer, *Trans. Am. El-chem. Soc.* 35; 239 (1919), is thought to be the earliest publication of the high commercial importance of this improvement of the graphite anode. It has not been emphasized as one of the basic milestones in the progress of electrolytic alkali.

In the light of modern chemical engineering, the work of these pioneers tends to pass into obscurity. It does not detract from subsequent achievements, however, to have their names on the record.

The "American Student"
COURTLAND F. CARRIER
White Plains, N. Y.



Mutual's

# POTASSIUM CHROMATE

**OTHER NAMES:** Chromate of Potash

**FORMULA:** $K_2CrO_4$

**MOLECULAR WEIGHT:** 194.20

**DESCRIPTION:** Non-hygroscopic, yellow, small, bipyramidal rhombic crystals. Bulk density averages 105 lb. per cu. ft.

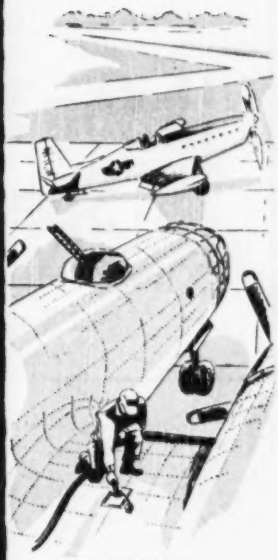
| | |
|---|---|
| $K_2CrO_4$ | 99.8 % min. |
| Chloride as Cl | 0.06 % max. |
| Sulfate as $SO_4$ | 0.10 % max. |

**USES:** Replaces bichromates or sodium chromate where a non-hygroscopic alkaline compound is required, as in proprietary mixtures for corrosion control, metal surface treatment, etc.

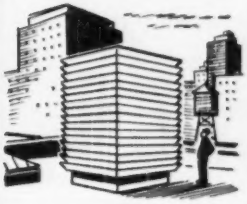
**SHIPPING CONTAINERS:** Fibre Drums — 100 lb. net, 400 lb. net.

**OTHER MUTUAL PRODUCTS**

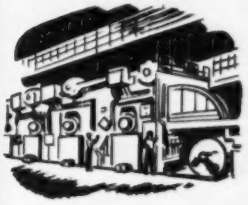
- Sodium Bichromate
- Potassium Bichromate
- Sodium Chromate
- Ammonium Bichromate
- Chromic Acid



AIRCRAFT FUEL TANKS



AIR CONDITIONING



METAL SURFACE TREATMENT


## MUTUAL CHEMICAL COMPANY OF AMERICA

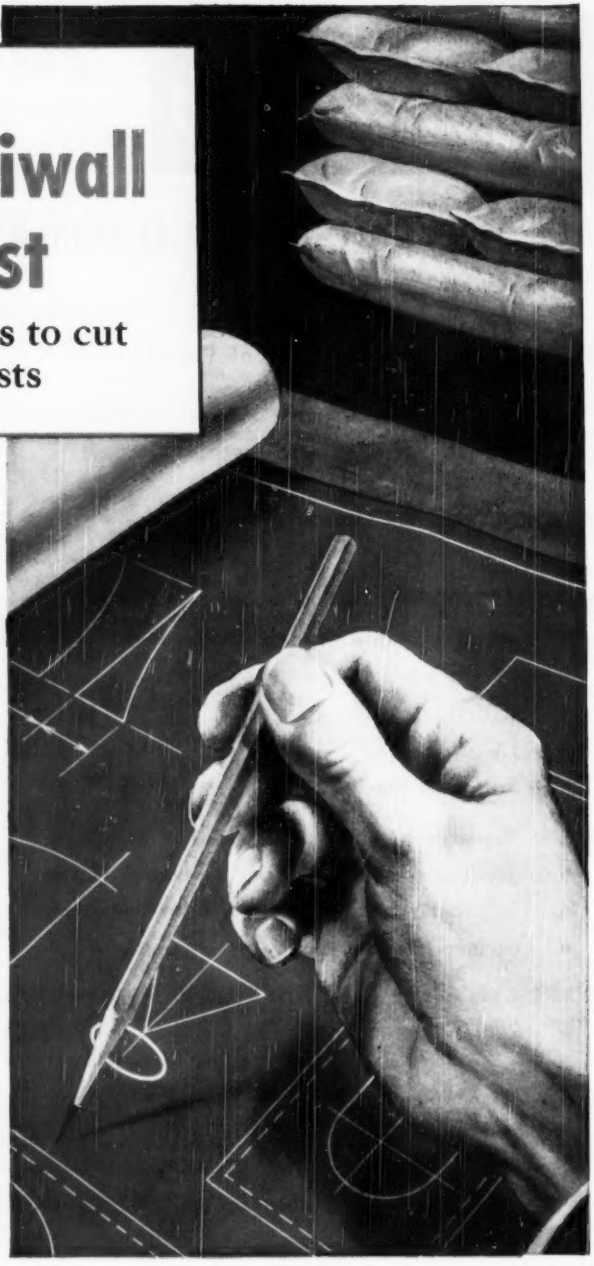
270 MADISON AVENUE ● NEW YORK 16, N. Y.


MUTUAL CHEMICAL CO. OF AMERICA — SINCE 1845

*Your*

# Union Multiwall Specialist

## Knows many ways to cut packaging costs



HOW LONG has it been since an *expert* analyzed your packaging methods?

Recent improvements in packaging methods and materials now make Union Multiwall Bags the preferred packaging for many different commodities . . . over 300 in all. They speed up packaging, cut labor and shipping costs, guard against contamination.

Even if you're now using multiwall bags, the Union Multiwall representative who calls on you can give you new ideas that may save you money. For he is backed by the specialized packaging knowledge of America's largest maker of paper bags—with its own forests, the largest completely integrated Kraft pulp-to-bag plant in the world, and skilled engineers and designers.

Let him show you how Union resources and packaging experience can help you!

Multiple Protection

Opens Easily

Prevents Siftage

Empties Clean

# UNION Multiwall Bags

**UNION BAG & PAPER CORPORATION**

233 BROADWAY, NEW YORK 7, NEW YORK

*Offices in:* CHICAGO, ILL. • NEW ORLEANS, LA. • MINNEAPOLIS, MINN. • KANSAS CITY, MO. • HOUSTON, TEXAS

TRADE MARK UNION

*If you need...*

**BENZOL • TOLUOL • XYLOL**
**NAPHTHALENE • PHENOL • CRESOL**
**PICOLINES • PYRIDINE • CREOSOTE OIL**
**AMMONIUM SULPHATE**
**CRESYLIC ACID**

*Get in touch with one of these offices...*

**COAL CHEMICAL SALES DIVISION**
**United States Steel Corporation Subsidiaries**
**71 Broadway, New York 6, N. Y.**

**208 SOUTH LA SALLE ST.,**
**CHICAGO 90, ILL.**

**1509 TERMINAL TOWER**
**CLEVELAND 13, OHIO**

**BROWN-MARX BUILDING**
**BIRMINGHAM 2, ALA.**

**25 BEALE ST.,**
**SAN FRANCISCO 5, CAL.**

**Please use this coupon**

Coal Chemical Sales Division
United States Steel Corporation Subsidiaries
71 Broadway, New York 6, N. Y.

Gentlemen:

Please send information on the availability of the following products:

☐ Benzol ☐ Toluol ☐ Xylol ☐ Naphthalene ☐ Phenol ☐ Cresol ☐ Cresylic Acid
☐ Pyridine ☐ Creosote Oil ☐ Ammonium Sulphate ☐ Picolines

Name.....

Company.....

Position.....

Address.....

**USS COAL CHEMICALS**

**UNITED STATES STEEL**

F A M O U S

## Caustic Comments

When invited to attend a dinner party given by a snobbish socialite, the late John Barrymore replied in caustic tones, "I'm frightfully sorry I won't be able to come, Mrs. Bore. I have a previous engagement which I shall make just as soon as I possibly can!"

# Dow

ONE OF MANY DOW CHEMICALS SERVING AMERICAN INDUSTRY

# Caustic Soda

**We have a *Caustic* Soda message also:**

**Dow is exceptionally well situated to supply industry with Caustic Soda in the Dow tradition of service, reliability and product-quality. Three Dow plants—in California, Texas and Michigan and bulk tank terminal distributing facilities at Carteret New Jersey—are strategically located to serve your needs, wherever you may be.**

**"ORDER FROM DOW"**

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

**or telephone the nearest DOW branch office**

| | | | |
|---|---|---|---|
| Atlanta | MAin 3085 | New York | PLaza 7-8300 |
| Boston | HUbbard 2-4890 | Philadelphia | Rittenhouse 6-2280 |
| Chicago | Financial 6-4221 | St. Louis | NEwstead 4977 |
| Cleveland | TOwer 1-5825 | San Francisco | GArfield 1-8323 |
| Detroit | TRinity 2-8186 | Seattle | SEneca 6488 |
| Houston | CHarter 3506 | Washington | REpublic 6608 |
| Los Angeles | TUcker 3181 | | |

The Dow Chemical of Canada, Limited, Toronto . . . Elgin 9208

DOW

CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE

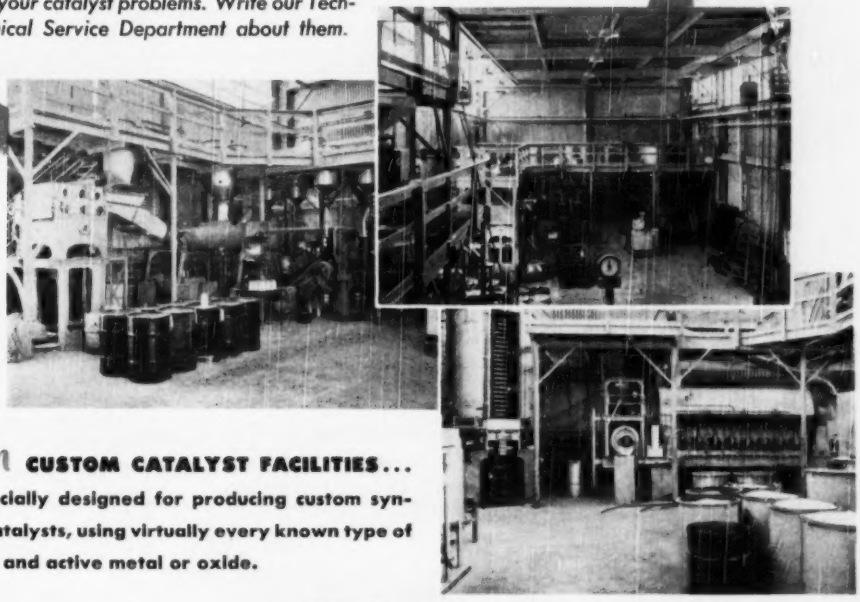
# NEED A *Special* CATALYST?

## ....consult DAVISON

*Specialists in the art of producing synthetic catalysts*

*The Davison Technical Staff offers you skill and knowledge acquired in the only reliable and thorough school we know—the school of long experience. For producing your catalysts, we offer a modern, new plant—designed, built and equipped exclusively for producing complex custom catalysts of highest uniformity and purity on an economical basis.*

*Whether your requirements are for catalysts in granular, pelleted or powdered form—by the pound or ton—it will pay you in time, money and performance to make Davison your partner in solving your catalyst problems. Write our Technical Service Department about them.*



*Davison* **CUSTOM CATALYST FACILITIES... are specially designed for producing custom synthetic catalysts, using virtually every known type of support and active metal or oxide.**

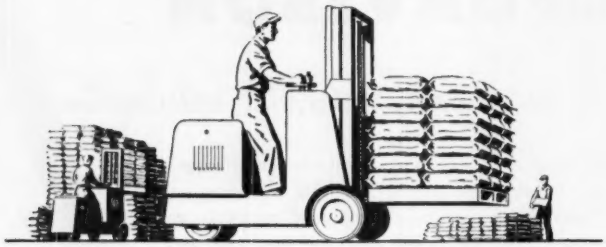
THE DAVISON CHEMICAL CORPORATION

*Progress Through Chemistry*

BALTIMORE-3, MD.

*Producers of: SILICA GEL, SILICOFLUORIDES, CATALYSTS, CASTING COMPOUNDS, ALUM, INORGANIC ACIDS, FERTILIZER MATERIALS*

# *NOW!* Stearic Acid of Laboratory Purity *in Commercial Quantities*



HYSTRENE* brings to the chemical industry a new concept of fatty acid purity . . . offers you a combination of features never before obtainable commercially.

Consider the opportunities for the development of superior products opened by these qualities:

1. Exceptionally low level of odor, color, and taste.
2. Unsaponifiable matter below 0.2%.
3. Iodine value below 0.5.
4. From vegetable or animal sources only.

**HYSTRENE stearic acids**
**in uniform grades ranging from 70% to 97% in true stearic acid content.**

Here is a new series of saturated fatty acids of unusual chemical purity—true stearic acid content as high as 97% with virtually no unsaturated acids or unsaponifiables. Find out where this new standard of purity for stearic acid fits into *your* operations—write for full information today.

*Trade Mark

## ATLAS CHEMMUNIQUÉ

### *Emulsifiers from Beeswax Make Soap-free Creams*

**Soap-free cold creams have been a tough problem for cosmetic technologists. But no more! Now Atlas is making new sorbitol-beeswax emulsifiers that produce stable cold creams, as well as all-purpose creams and hair dressings incorporating new effects. Ask for more info on G-1706 and G-1726, including typical cosmetic formulations.**

### *Sorbitol Goes to Work Against Tooth Decay*

**Several of the new ammoniated and chlorophyll-based toothpastes depend on Atlas sorbitol as a moisture-conditioner, bodying and sweetening agent. Blending well with other ingredients, it gives a full-bodied paste that holds its consistency well in dry atmosphere when the cap is left off.**

### *Cocoanut Stays Fresher Longer with Sorbitol*

**Manufacturers of shredded cocoanut have found that the Sorbo* grade of sorbitol keeps the nut meat in marketable condition longer. It has the added advantage of more pleasant flavor than other plasticizing agents.**

*Reg. U. S. Pat. Off.

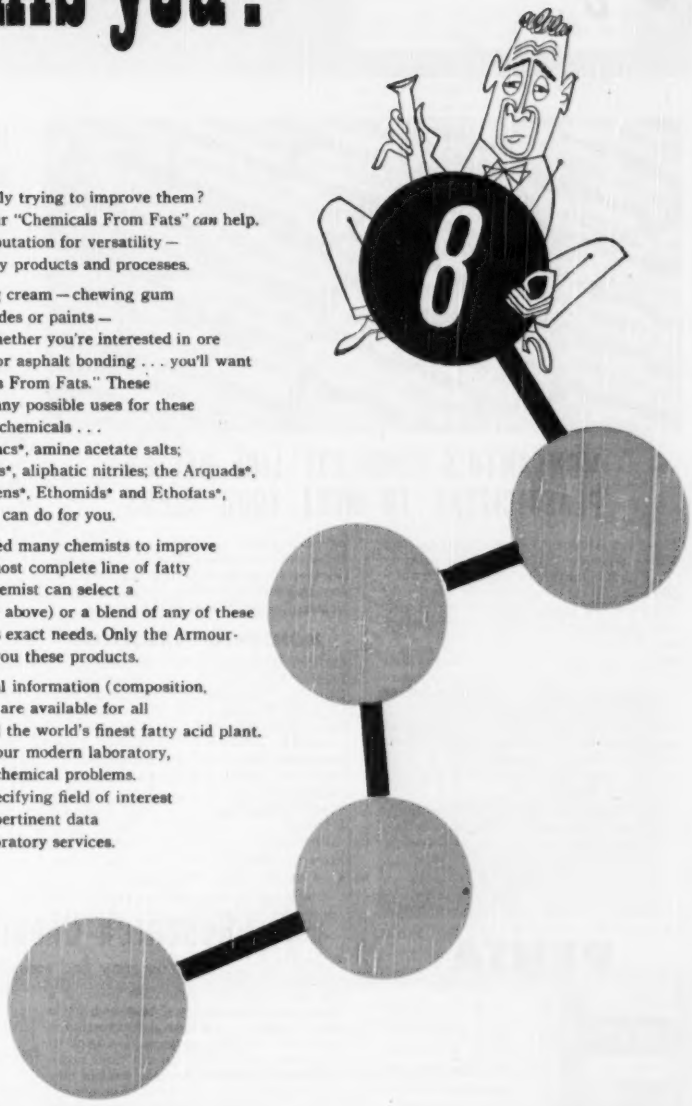
**ATLAS** INDUSTRIAL CHEMICALS DEPARTMENT

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

*In Canada address* A. F. Sterne and Sons LIMITED *Brantford, Ontario*

# Is this you?




Dissatisfied with your products? Constantly trying to improve them? Then, you're one of the many chemists our "Chemicals From Fats" *can* help. Why? Because these chemicals have a reputation for versatility — a versatility that has helped improve many products and processes.

Whether you make deodorants or shaving cream — chewing gum or candy — disinfectants or inks — germicides or paints — carbon papers or vanishing creams . . . whether you're interested in ore flotation or paper coating, textile dyeing or asphalt bonding . . . you'll want to know more about Armour's "Chemicals From Fats." These applications indicate only a few of the many possible uses for these versatile high molecular weight aliphatic chemicals . . . the Armeens®, aliphatic amines; the Armacs®, amine acetate salts; the Armids®, aliphatic amides; the Arneels®, aliphatic nitriles; the Arquads®, quaternary Ammonium salts; the Ethomeens®, Ethomids® and Ethofats®, ethylene oxide derivatives. See what they can do for you.

Our Neo-Fat® fatty acids have also enabled many chemists to improve their products and processes. From the most complete line of fatty acids that can be found anywhere, the chemist can select a pure fatty acid (concentrations of 90% or above) or a blend of any of these pure saturated acids tailor-made to fit his exact needs. Only the Armour-developed *fractional*-distillation can give you these products.

**Free booklets,** containing valuable technical information (composition, properties, constants and indicated uses) are available for all of our chemicals. We have just completed the world's finest fatty acid plant. This plant and the complete facilities of our modern laboratory, also stand ready to assist you with your chemical problems. Write us on your business letterhead, specifying field of interest and booklets desired. Include additional pertinent data if you wish to take advantage of our laboratory services.

®T. M. REG. U. S. PAT. OFF.

**ARMOUR** *Chemical Division*

Armour and Company • 1353 W. 31st Street, Chicago 9, Illinois • 120 Broadway, New York 5, New York

# For Your Information

Every month Monsanto publishes these pages of pertinent information, selected to help you improve your products, lower your production costs, increase your sales... Reprints will be sent regularly to you or other members of your organization on request.

## MONSANTO'S COMPLETE LINE OFFERS PLASTICIZERS TO MEET YOUR NEEDS

There's a Monsanto Plasticizer that can deliver *any quality* you want in your product . . . if that quality can be derived from a plasticizer. This is true because Monsanto offers you the most complete line of primary and secondary plasticizers available anywhere.

Monsanto Plasticizers are so varied that there is not a resin in commercial production that cannot be plasticized by one or more Monsanto Products. There are Monsanto Plasticizers that deliver essential qualities to the best of vinyl films. Others are so low in price that they can be used to gain a favorable competitive position in buyer's markets.

If you manufacture plastic free films, molding compounds, surface coatings, adhesives, synthetic rubber, wood bonding agents or textile and paper coatings, it will be worth your while to read Monsanto's booklet of quick reference material. It's free. Ask for the booklet: "Monsanto Plasticizers," when you mail the coupon.

### MONSANTO PLASTICIZERS

- Dibutyl Phthalate
- Diethyl Phthalate
- Dimethyl Phthalate
- Diphenyl Phthalate
- Santicizer * 107 (DOP)
- Santicizer 160
- Santicizer E-15
- Santicizer B-16
- Santicizer M-17
- Tricresyl Phosphate
- Triphenyl Phosphate
- Santicizer 140
- Santicizer 141
- Aroclor *
- HB-40
- Santicizer 3
- Santicizer 8
- Santicizer 9
- Santicizer 1-H
- Ortho-Nitrobiphenyl (ONB)

## If Weeds Worry You, Read These Booklets

The weed problem is a business expense for many industries. If your business is one with weed worries, we will be glad to send you copies of the booklets. They are *free.*

"*Controlling Weeds With Chemical Sprays*" is a general presentation of the chemical solution to the weed problem. This book will give you valuable information about chemicals for pre-emergence and post-emergence weed control, selective and non-selective chemical sprays and a wealth of other data about herbicide compounds.

"*Chemical Weed Control On Rights of Way*" tells how to get rid of weeds along telephone and electric lines and along railway and pipe-line rights of way.

Many industries are using Monsanto Herbicidal Chemicals in their weed-control operations. These chemicals are:

- 2,4-D ACID
- 2,4-D SODIUM SALT
- 2,4-D ISOPROPYL ESTER
- 2,4,5-T ACID
- 2,4,5-T ISOPROPYL ESTER
- SANTOBRITE * (Sodium Pentachlorophenate, Tech.)
- SANTOPHEN * 20 (Pentachlorophenol, Tech.)
- ISOPROPYL N-PHENYL CARBAMATE
- SODIUM TRICHLOROACETATE

## PENTA

"*PENTA to preserve wood on the farm*" is interesting reading for anyone who works with agriculture as a farmer or as a producer of farm supplies. PENTA-chlorophenol is gaining in usage as a wood preservative on the farm and in industry. If you want a copy of this booklet, mail the coupon.

## Research Chemists' Corner

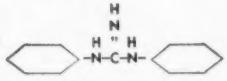
***You may find something new here***

Diphenylguanidine, described here, is a Monsanto Chemical which may have a great future . . . perhaps a future that is important to your business. Look at its properties. See if they do not hold possibilities for you in the development of new products or the improvement of your present line. If you want to experiment with diphenylguanidine, you can get a sample by mailing the coupon, contacting the nearest Monsanto Sales Office or writing to Monsanto headquarters, St. Louis 4, Mo.

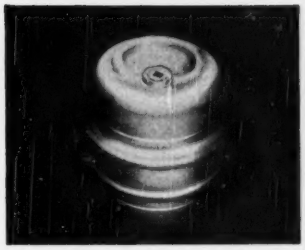
**Reactions:** A strong organic base which forms salts with many organic and inorganic acids. Condenses with formaldehyde to form resins.

### DIPHENYLGUANIDINE

**Structure:**



| | |
|---|---|
| **Appearance:** | White powder |
| **Specific Gravity:** | 1.19 @ 25° C. |
| **Assay:** | 99% minimum by acidimetric titration |
| **Moisture:** | 0.5% maximum |
| **Ash:** | 0.3% maximum |
| **Solubility:** | Soluble in alcohol, benzene, chloroform, and ether. Very slightly soluble in water. |



## It's safer and easier to handle nitric acid in stainless steel container

Carboys . . . those big glass bottles that stick their necks out of wooden boxes . . . have carried corrosive chemicals as long as there has been a chemical industry. Now, there's a successor to the big bottle in transporting nitric acid. It's Monsanto's stainless steel container.

The new container is 50 pounds lighter in weight, hence easier to handle . . . easier to store. There's a saving on freight, too. It holds 15 gallons . . . two more than a carboy. It's safer because the danger of breakage is eliminated.

## Sterox CD gives you controlled sudsing and high detergency

For applications requiring an efficient detergent making very little suds, Monsanto's Sterox* CD is a wise choice. Sterox CD is a 100%-active, nonionic-type surface-active agent, emulsifier and detergent. It is a pale yellow liquid, with medium viscosity at room temperature. Its mild, somewhat sweet, fatty odor is not objectionable, but Sterox CD can be perfumed easily where fragrance is important.

Sterox CD is a versatile product, its applications ranging from cosmetic preparations to metal cleaners. It is an efficient detergent in hard or soft water and over a wide range of temperatures. The most generally used applications include compounds for laundry operations, scouring in textile processes and general industrial cleaning.

Complete details on Sterox CD are published in Monsanto Technical Bulletin No. P-129, recently off the press. For your copy of this useful publication, mail the coupon or contact the nearest Monsanto Sales Office.

## SANTOMERSE No. 1 CLEANS IN TEMPERATURES BELOW ZERO

Frozen food locker owners are making good use of Monsanto's Santomerse* No. 1 in cleaning compartments and other parts of their plants which must be kept at low temperature. Santomerse No. 1 is successful in removing fruit stains, blood and fatty particles even when the mercury in the thermometer has to look up to see the zero. Locker managers use a solution of 2½ pounds of salt and 2 ounces of Santomerse to a gallon of water. It cleans well at −4° F.

Its ability to function at low temperature indicates that Santomerse No. 1 can be of service in any industry where there are cold processes. It also can serve in many other industries in which cold test rooms are necessary.

### AN ALL-PURPOSE DETERGENT

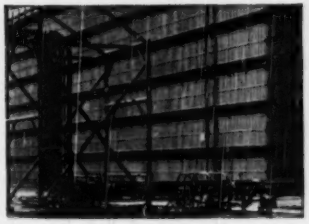
Santomerse No. 1, an all-purpose detergent and wetting agent, is used widely in industrial cleaning. It cuts grease and dirt, lifting up particles of soil and holding them in suspension to be carried away in the rinse.

Santomerse No. 1 is widely used in the textile industry and in other enterprises in which there is need for an efficient wetter, penetrant, disperser, emulsifier or cleaner.

Here are quick facts about Monsanto's Santomerse No. 1:

Santomerse No. 1 is an excellent detergent . . . a rapid and thorough wetter. It reduces surface and interfacial tensions . . . has high stability to acids and alkalies . . . provides fast penetration . . . has high resistance to metallic ions . . . makes abundant suds . . . rinses rapidly and thoroughly.

If your business requires a detergent and wetting agent, look into efficient, economical Santomerse No. 1. Data and quotations will be sent upon request. Use the convenient coupon for prompt reply.



Slime and algae, enemies of good operation of cooling towers such as the one illustrated above, can be kept under control by the use of Santobrite* (Monsanto's sodium pentachlorophenate, technical). Santobrite is easy to use . . . economical . . . efficient. If you foresee a slime and algae problem next summer, send for a copy of Monsanto Technical Bulletin No. O-15. It's easier to prevent than to overcome such a problem.

## Cutting oils plus Monsanto chemical step up efficiency

Santolube* 52, newest member of the Monsanto Petroleum Additive family, steps up the efficiency of cutting oils in tapping and thread-cutting operations.

Santolube 52 is free of phosphorus, sulfur and chlorine, therefore its use does not appreciably alter the ratio of these elements in a cutting oil formulation. It is available now . . . at economical prices.

MONSANTO CHEMICAL COMPANY, 1703-B South Second Street, St. Louis 4, Missouri. District Sales Offices: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

*Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS for PLASTICS

SERVING INDUSTRY... WHICH SERVES MANKIND

Sterox CD: ☐ Sample, ☐ data, ☐ quotations.
Diphenylguanidine: ☐ Sample, ☐ data, ☐ quotations.
Santomerse No. 1: ☐ Sample, ☐ data, ☐ quotations.
Santolube 52: ☐ Sample, ☐ data, ☐ quotations.
Santobrite: ☐ Sample, ☐ data, ☐ quotations.
Booklet: "Monsanto Plasticizers" ☐
Booklet: "Controlling Weeds with Chemical Sprays" ☐
Booklet: "Chemical Weed Control on Rights of Way" ☐
Booklet: "Penta to Preserve Wood on the Farm" ☐

MONSANTO CHEMICAL COMPANY
1703-B South Second Street
St. Louis 4, Missouri

Without cost or obligation, please send information indicated at the left.

Name _____ Title _____
Company _____
Street _____
City _____ Zone _____ State _____

# Morpholine

## Solves 2 big problems

Morpholine is a mild organic base miscible in all proportions with water. Its volatility is so close to that of water that uniform alkalinity is maintained during evaporation of its dilute aqueous solutions.

### PREVENTS CORROSION

Morpholine effectively combats corrosion in steam heating systems due to dissolved carbon dioxide. Morpholine is effective at much lower concentrations than other inhibitors, allowing lower costs in steam treating. Morpholine is also suggested as a volatile inhibitor in metal cutting oils.

### MAKES WATER-RESISTANT EMULSION FILMS

With fatty acids, morpholine readily forms soaps which are outstanding emulsifying agents for rubless polishes, paper coatings, water paints, insecticides and other mixtures. After application the morpholine evaporates *along with the water*, leaving the oil or wax film resistant to spotting or removal by water.

### AND THAT'S NOT ALL

Morpholine and the substituted morpholines—methyl, ethyl, hydroxethyl, aminoethyl, and aminopropyl morpholine—are interesting as solvents and chemical intermediates.

### WOULD YOU LIKE TO KNOW MORE?

Then write for the new edition of EMULSIONS AND DETERGENTS (F-4186) which contains much helpful general information and many suggested formulations. When writing—please address Department D-2.

***PHYSICAL PROPERTIES***

| | |
|---|---|
| Specific Gravity 20/20°C. | 1.0017 |
| Boiling Point °C. 760 mm. | 128.6 |
| Vapor Pressure 20°C. | 8.0 mm. Hg |
| Flash Point (TAG open cup) | 100° F. |

Completely miscible with water in all proportions

**CARBIDE AND CARBON CHEMICALS DIVISION**

**Union Carbide and Carbon Corporation**

**30 East 42nd Street UCC New York 17, N. Y.**

Offices in Principal Cities

In Canada:

Carbide and Carbon Chemicals, Limited, Toronto

# Chemical Industries

THE MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES


Newsletter,
February, 1950

For Your Information:

Carbide and Carbon Chemicals Division of UCC expects in the very near future to become the first commercial producer of allyl cinerin, the synthetic pyrethrum analog synthesized recently by U. S. Department of Agriculture chemists. If approved by USDA it will probably be produced as a liquid concentrate and marketed through established distributors.

Carbide and Carbon has started making maleic anhydride (CI Newsletter, September 1949) and is now offering it as well as several maleic esters. The anhydride is marketed in the form of squat, hollow cylinders, the surface area of which is 20% greater than that of corresponding solid cylinders. Likely bet for the future: production by Carbide of succinic derivatives, tetrahydrophthalic anhydride and other derivatives of maleic.

* * CI * *

A new miticide, EPN 300 (ethyl p-nitrophenyl thionobenzenephosphonate), will soon be distributed by Du Pont as a wettable powder in 1-, 2-, and 3-lb. containers. Applied to fruit trees--e.g., apple, pear, peach, plum--during the growing season, the compound is claimed to be less toxic to warm-blooded animals than other organic phosphorus derivatives now in common use.

Pestox 3, a new insecticide (tetrakis-dimethylaminophosphonous anhydride), first made by I. G. Farben in Germany, synthesized by improved methods by Pest Control Ltd., Cambridge, England, and now being distributed for experimental purposes to various Government testing stations in this country by Dow Chemical Co., is taken up in the sap stream of plants, renders systemic protection for several weeks. It is selective in that it kills aphids and red spiders, doesn't injure beneficial insects like wasps, bees, and ladybugs. Two applications (as against six for nicotine) protect hops, strawberries, brussels sprouts and peanuts for a whole season, and no toxicity remains in the plant if sufficient time elapses between final spraying and harvesting.

* * CI * *

Watch for announcement soon of a new bead form of gas coke made by an entirely new process. Product is in pilot-scale production, is said to provide an unusually pure source of carbon for industry.

First steps have been taken to set up a new independent research and engineering laboratory at Edgartown, Martha's Vineyard, Mass. Plan is to

develop laboratory facilities and a top-grade team of scientists to handle industrial investigations in various fields. Principals are Arthur D. Weston, former chief engineer, Massachusetts State Department of Public Health; F. C. Atwood, consulting chemist; and Frank C. Wright, recently economic advisor to the American administration in Germany.

* * CI * *

National Lead Co. has made a proposal, unaccepted as yet, for a lease on part of the Basic Magnesium plant at Henderson, Nevada. Concurrent negotiations are under way on power rates. Plans for use of the facilities have not been disclosed by the company, but metals or titanium pigments are a reasonable guess.

Revolutionary in the packaging field is the fabrication of printed polyethylene film (either single- or double-wall) into crimp-sealed tubular containers. This is a joint development of Du Pont, Stokes and Smith Co., and Transparent-Wrap Machine Corp. Automatic machinery takes film sheets and the material to be filled, and out pop finished packages filled with a predetermined amount of liquid or solid product. Formidable obstacles that were overcome: static electricity and printing on the film.

* * CI * *

Work done at the Naval Stores Research Division of Southern Regional Research Laboratory (USDA) indicates that terpene peroxides could compete with cumene hydroperoxide in synthetic rubber manufacture.

Look for a sharp drop soon--20% or better--in the price of allyl starch. For the first time the price will be definitely below that of shellac and within striking distance of other competitive resins. Most of the material is going into printing inks for use on glassine and PT cellophane, but promising developmental applications include beer can and furniture coatings (CI, December 1949, p. 875). General Mills is the sole producer.

* * CI * *

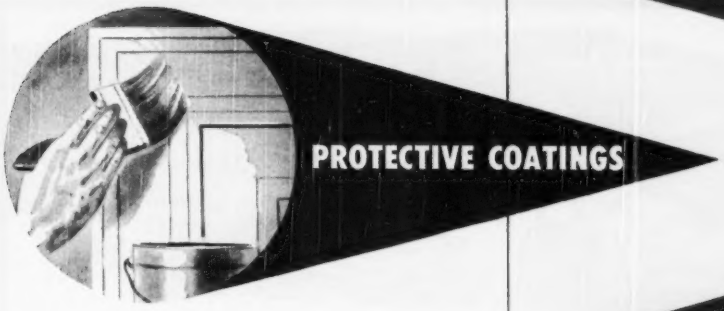
Here and There:

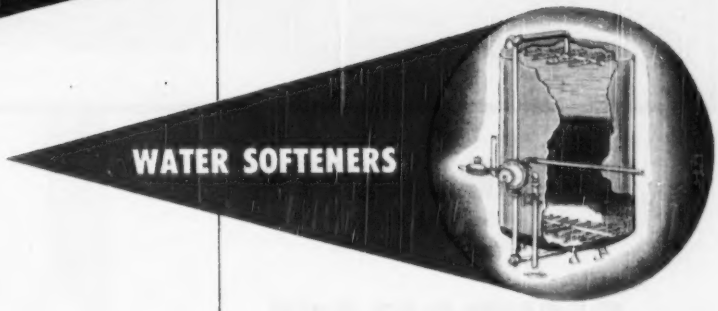
Jefferson Chemical Co. is considering production of ethanolamines at its Port Arthur, Texas, plant...Expanding uses of lithium and its derivatives is keeping Metalloy Corp.'s sales abreast of full production capacity...According to a patent (U. S. No. 2,486,090) assigned to American Cyanamid Co., alkyl thiocyanates--useful as insecticide bases--can be made by reacting an alkyl mercaptan with a cyanogen halide (e.g., chloride) in the presence of an alkali catalyst mixture. Monsanto is considering manufacture of thiophene.

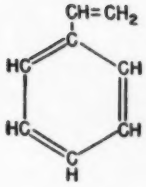
It is predicted in some quarters that antihistamine agents will hit $100 million this year. The Federal Trade Commission and the Food & Drug Administration have adopted a "wait and see" policy, but some Congressional committees are concerned about advertising claims and possible toxicity... Two new detergent producers: Hercules is about to start commercial production of a rosin-base product. General Mills has an experimental product of undisclosed type in the works that is said to show promise but is not yet in the sampling stage.

The Editors

# If you make




## Koppers Styrene Monomer is worth investigating

● Koppers Styrene Monomer is known best through its extensive use in the preparation of polystyrene molding materials and in the production of GR-S type synthetic rubbers. But this unsaturated, aromatic hydrocarbon offers you many other chemical possibilities as a polymer and copolymer.

Styrene Monomer finds valuable application in the formation of polyester laminating and casting resins, ion exchange resins, and styrenated alkyds, or drying oils, for protective coatings. As an intermediate, Koppers Styrene Monomer enters into many reactions leading eventually to a wide variety of chemical products.

The extensive styrene-producing facilities of Koppers Chemical Division make it possible to offer you this compound in a highly-pure state at a low, commercially-practical price. It will pay you to investigate the possibilities of Koppers Styrene Monomer. For complete information on the properties, reactions and uses of Styrene Monomer, write for Bulletin C-8-119. Please send your request to Koppers Company, Inc., Chemical Division, Dept. CI-2, Pittsburgh 19, Pa.

KOPPERS

KOPPERS COMPANY, INC., CHEMICAL DIVISION, PITTSBURGH 19, PA.

# *Forty Years of Progress*

**BICHROMATE of SODA**

**BICHROMATE of POTASH**

**SODIUM SULFATE**

**SODIUM CHROMATE**

SOLE MFRS. SINCE 1909
BICHROMATES
Natural
CHROMIUM PRODUCTS
NATURAL PRODUCTS REFINING CO. JERSEY CITY, NEW JERSEY.

*for Purity—Uniformity—Full Weight*
*Specify "NATURAL"*

**NATURAL PRODUCTS REFINING COMPANY**
JERSEY CITY, N. J.

# NEW FRONTIERS FORMING

*by* ***ROBERT L. TAYLOR, Editor***

WE DON'T KNOW IF YOU'VE NOTICED, but certain segments of the chemical industry seem to be hearing voices.

These voices warn of an impending problem of a special kind, a kind with which this industry has not had to concern itself greatly in the past. It is a problem that in the classroom is known as *economic shortages.*

***Here's the way it works:*** A chemical raw material or intermediate—say benzene, for example—has been available for a number of years at around the same or a decreasing price, or perhaps we should say relative price in recognition of today's diminishing dollars. Over these years a number of important chemical uses have developed. These uses, as would be expected, have grown along with the chemical industry, and new ones have been added.

But one day it develops that as a result of this growth the demand for 20-cent-a-gallon benzene begins to press on supply, which is determined by the amount available from coke-oven operations. There are other potential sources, of course, notably petroleum, but to trap these sources on a large scale would require assurance of a benzene market at about 30 cents a gallon—quite a jump from 20 cents.

When a material must negotiate a major price hurdle of this kind before it can make further progress the natural assumption is that there is going to be trouble for somebody. The normal course is for price to go up more or less gradually according to demand, and the devil take the poor user who can't absorb the increase.

***That's what is meant*** by economic shortage, and that's what many people in the industry mean when they talk about warning voices.

Certainly such situations are going to appear more often and over a broader area as growth in chemical production takes place. Economic limits are bound to be reached. They are being approached now in benzene. Glycerine users went through the ordeal two or three years ago and still aren't completely over it.

***Where we disagree*** with most of the hearers of voices, however, is that these sounds must necessarily be messages of gloom. As we look back at similar situations in the past, although they have sometimes meant upheavals and readjustments, more often than not they have also provided the stimulus for new products or processes which have actually extended the economic boundaries within which the consuming industries can work.

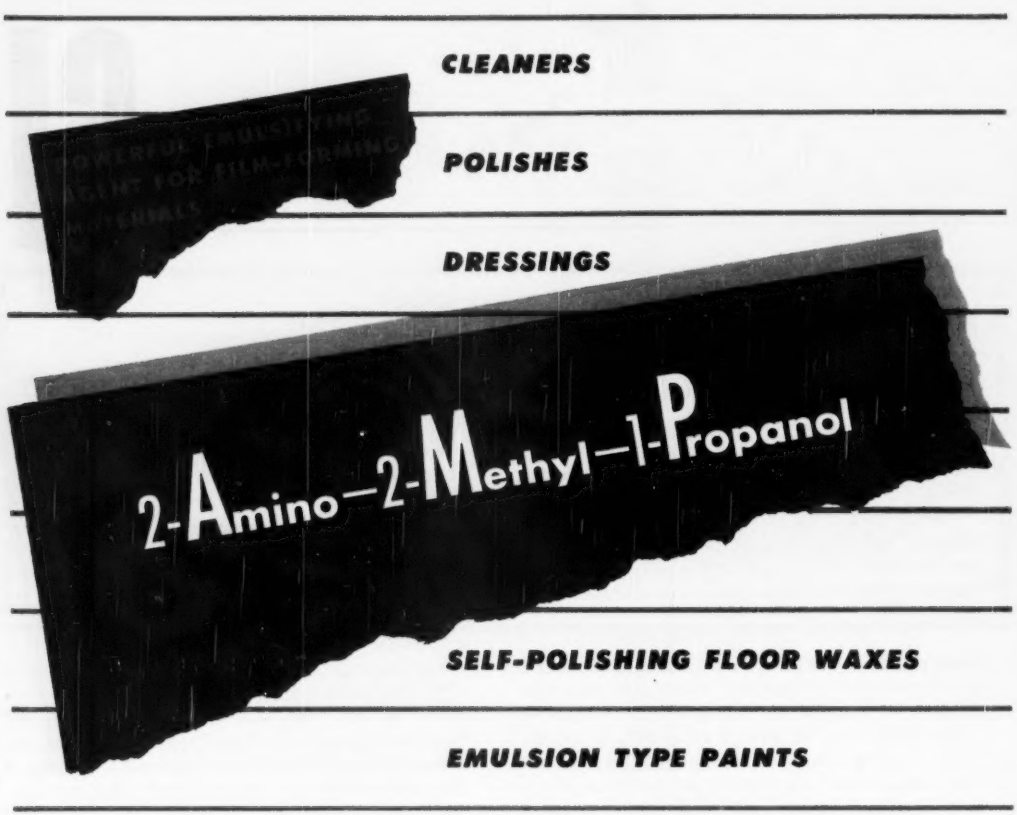
Ten years ago, for example, there was no incentive to produce cheap benzene from petroleum. Coke oven operations were supplying all that was needed and then some. Likewise there appeared to be no great percentage in doing a lot of work to extend knowledge of alternate methods of producing other coke-oven fractions.

But every chemical man is familiar with what happened when wartime need for aromatics sent demand skyrocketing.

A great new toluene-from-petroleum industry sprang up and the price of toluene held steady while almost all other prices were increasing. Huge demands for high-aromatics aviation gasoline resulted in research which has brought petroleum benzene much closer to commercial reality. Butadiene became a volume chemical over night and considerable research was done on cyclohexane, with the result that today one of our great new industries—nylon—is in the happy position of having these two additional strings to its raw materials bow.

***It is true*** that the war telescoped what under normal conditions would have taken a much longer time, but the results are similar.

Thus it would seem that the sensible way to look at economic shortages is to welcome them for what they are: signposts to new opportunities, to an ever-expanding economy that makes wider and more profitable use of the raw materials that Nature provides more bountifully. It is upon such a credo, in fact, that the chemical industry has been built. There is every good reason to believe that progress will continue in the same direction and by the same means.




**PROPERTIES OF PURE MATERIAL**

| | |
|---|---|
| Molecular Weight | 89.14 |
| Melting Point, °C | 30 to 31 |
| Boiling Point, °C | 165 at 760mm |
| Specific Gravity | 0.934 at 20/20°C |
| pH at 20°C of 0.1M Solution | 11.3 |
| Vapor Pressure at 20°C | approx. 1mm |
| Flash Point (Tag. open cup) | 159°F |
| Solubility in Water g/100 ml at 20°C | completely miscible |
| Index of Refraction at 20°C | 1.449 |

**AMP** IS AN OUTSTANDING emulsifying agent for film-forming materials and imparts excellent water resistance to the film.

The higher fatty acid soaps of AMP possess extremely high emulsifying efficiency and are stable in color. AMP's moderately high boiling point (165°C) minimizes evaporation loss and objectionable fumes during manufacture of emulsions—without detracting from desirable water resistance and durability of the film.

With its advantage of low combining weight (89.14) and its ability to emulsify a wide range of materials, AMP may solve your emulsification problem. Write, wire, or phone CSC today for additional information.

AMP

***also suggested for synthesis of***
***Dyestuffs • Wetting Agents***
***Photographic Developers • Pharmaceuticals***

CSC

**COMMERCIAL SOLVENTS CORPORATION • 17 EAST 42nd STREET, NEW YORK 17, N. Y.**

**PRODUCTS OF THE INDUSTRIAL DIVISION:** Ethyl Alcohol and Derivatives • Acetone • Butanol and Derivatives
Formaldehyde • Methanol • Amines • Nitroparaffins • Crystalline Riboflavin

# What's new

*Ford Motor Co.*

GLYCOL ANTIFREEZE: He'd better keep pouring.

## GLYCOL HITS HALF BILLION

**Plans now afoot will boost ethylene glycol capacity another 50%—to well over three times that at war's end.**

THE GIANT-SIZE ethylene glycol industry is due to receive still another shot of "growth factor." Several new units are now under construction, while another is due to reach that stage in the near future.

Units are being erected for Carbide and Carbon Chemicals Division of Union Carbide and Carbon Corp. at Institute, W. Va., and Whiting, Ind. They are expected to be on stream by early 1951. The Whiting unit will be Carbide's first at that location.

Another unit will be constructed for a fivefold combine formed by Chicago Corp.; Pontiac Refining Co.; one of Chicago's Carthage Hydrocol partners; a major producer of alcohol and marketer of antifreeze; and one other Texas company. This plant, at Corpus Christi, Texas, will add some 60 million pounds to present glycol capacity, now nearing 500 million pounds per year.

As a starter, the new combine has purchased the war surplus Great Southern 100-octane gasoline refinery at Corpus Christi from the government for $756,000. Engineering plans are being fitted to the new location. An additional expenditure of at least $15 million is expected before production can begin. In addition to glycol it is expected that about 10 million pounds per year of ethylene oxide and 5000 bbls. per day of gasoline will be produced.

Raw material will be ethane from the huge gas fields which surround Corpus Christi—Chicago controls the leases on 8000 acres of land in this area with an estimated gas reserve of 1.7 trillion cubic feet.

### Direct Oxidation

In the proposed Texas plant ethane will be dehydrogenated to ethylene, which upon oxidation yields ethylene oxide. Hydration of the oxide produces glycol.

This will be the only U. S. plant except for the several units operated by Carbide and Carbon at Texas City, Texas, and Institute, W. Va., to use direct oxidation of ethylene to ethylene oxide instead of chlorhydrination. Two of Carbide's units were completed during the latter part of 1949, one at each of the above locations. All of Carbide's new facilities will also employ direct oxidation.

Choice of direct oxidation for these latest plants would seem to prove that this process is the more economical. The actual reason for the choice, however, may be a matter of chlorine availability rather than of glycol economics: Provision of chlorine for chlorhydrination requires some assurance of a market for the corresponding quantity of caustic soda (*CI, June 1949, p. 936*). And such a market does not exist or even promise to exist in the near future. (The only exception to this is an organization that has the facilities to integrate for economical production via glycolic acid as operated by Du Pont at Belle, W. Va.)

These two new production units should provide a glycol production capacity approaching 750 million pounds per year by 1951, over three times the war's-end capacity of about 200 million pounds per year.

### Markets

At present supply and demand are fairly well balanced with the odds favoring a slight oversupply.

The consensus seems to be that about 30 million gallons (275 million pounds) per year are going into antifreeze. However, the total antifreeze market is about 80 million gallons per year and this apparent oversupply might well vanish if a few more automobile owners were convinced of the desirability of using permanent-type antifreeze, either by strong promotion or a price reduction.

Still, about 200 million pounds per year of current production capacity must find other outlets. And these outlets are scattered among a large number of relatively small uses—20-25 million pounds for dynamite, 12-13 million pounds for export, production of glyoxal, production of alkyd resins, and the like.

Normal expansion of all these mar-

kets could account for present capacity, but it does not account for the additional capacity due on stream by 1951.

There is only one other new tonnage use which may appear by 1951: It is expected that Du Pont's new polyester fiber, Delvon (terephthalic acid and ethylene glycol), will be in production by that time. Even so, this will not be sufficient to absorb a new supply of 250 million pounds per year of ethylene glycol, or even a major percentage of this figure.

### Ethylene Oxide

Ethylene oxide is a precursor of glycol in most plants. Thus it is possible to forget glycol and sell oxide; and ethylene oxide market prospects are therefore an integral part of any discussion on ethylene glycol.

Du Pont's Orlon (polyacrylonitrile) fiber production (*CI, Jan. 1949, p. 36*) will require, for the next few years at least, a very sizable new supply of oxide for acrylonitrile. This will be made available by new capacity which Jefferson Chemical Co. will place on stream at Port Arthur, Texas, over the next few months. But Du Pont is giving strong consideration to increasing Orlon capacity beyond that of the first plant, now building.

Carbide's Vinyon-N and Dynel contain 40% acrylonitrile, and acrylonitrile is a constituent of several fibers being considered by Chemstrand Corp.

These new fibers will of course mean more acrylonitrile, but this will not necessarily be produced from ethylene oxide. At least two processes for making it from acetylene and hydrogen cyanide are awaiting cheaper acetylene, soon promised.

Polyethylene oxide detergents and emulsifiers have carved out a sizable niche in both the household and industrial fields. Some expansion, but probably not more than a few million pounds per year, may be expected here. Other uses for ethylene oxide, such as the production of ethanolamines from the oxide and ammonia and of ethylene cyanhydrin for acrylic acid and esters, promise sizable expansions. However, with the possible exception of acrylonitrile production, sizable percentage increases in the rate of production of all would probably add less than 50 million pounds per year to current demand.

Any new production of oxide or glycol, then, will face serious marketing problems. The antifreeze market is the only visible one that has the promise of absorbing all of 1951's glycol—and this possibility doesn't look too good.

# SHORTCUT CANNING

**Unique food-processing method opens door to new antibiotics use.**

THE WORD "antibiotic" conjures up visions of hospital walls, internes in white coats, and hypodermic needles.

That isn't strange, for the study on antibiotics for food preservation, by Ariel A. Anderson and H. David Michener at the Western Regional Research Laboratory, Albany, Cal., is one of the first reported on an investigation into other possible uses for these substances.

G. E. HILBERT: Lower heat, better flavor.

A series of canning tests using only mild heat treating (212° F. as compared with the conventional 240° F.) for only a few minutes in the presence of very small amounts of subtilin has shown that foods can be preserved by this method. Subtilin, an antibiotic discovered by the Western Laboratory, is produced by submerged culture of a certain strain of bacteria, *Bacillus subtilis*, which occurs widely in nature and normally exists in many food products.

### Supplements Heat

It is well known that mild heat treatment will destroy non-spore-forming bacteria, yeasts and fungi, and inactivate natural enzymes which otherwise cause food to spoil. Add to this treatment the destruction of other food-spoiling organisms, chiefly spore-forming bacteria, by one or more antibiotics and you have the essence of the new process.

Several foods have been preserved from microbial spoilage with subtilin. Even a homologous strain of *B. subtilis* is completely inhibited by as little as one ppm of subtilin anaerobically and by five ppm aerobically. Among the foods tested are peas, asparagus, corn, green beans, peeled potatoes, tomato juice and milk. The following summary of results of experiments with peas, asparagus and corn illustrate the effectiveness of the process in canned food preservation. These results—except for the corn—show the minimum combinations of subtilin amounts and time at 212° F. which give satisfactory preservation. (Ordinary canning at 240° F. or higher in pressure cookers usually requires 30-60 minutes.)

| *Vegetable* | *Ppm subtilin* | *Minutes at 212°F.* |
|---|---|---|
| Peas | 5 | 10 |
| | 10 | 5 |
| Asparagus | 5 | 20 |
| | 10 | 10 |
| Corn* | 5 | 20 |

* Only one trial.

Dr. G. E. Hilbert, Chief of the Bureau of Agricultural and Industrial Chemistry, pointed out that several years of work will probably be necessary before the new method's suitability for use in canning or other food preserving techniques is known. One particularly important question—whether the antibiotics, if used, are toxic to man—can be answered only after long and careful investigation.

### Appears Harmless

Several preliminary tests have yielded encouraging results along these lines. One hundred ppm of subtilin in rat diets has not affected the growth nor visibly affected the health of the animals over a six-months' period. In a single experiment with a rabbit, oral administration of a relatively large dose of subtilin (a thousandth of its body weight) caused no ill effects. In spite of its wide distribution in nature no illness has been attributed to *B. subtilis*. Finally, the microflora of the intestinal tract are presumably not affected because subtilin has no antibiotic effect against the Gram-negative bacteria which predominate there.

If further trials confirm the preliminary findings and reveal no major new difficulties, it is possible that this method will eventually lower canning costs by elimination of the need for pressure-cooking equipment and make some canned foods more appetizing. The antibiotics used do not affect the taste of the food, and since only a mild heat treatment is required, the final products have better flavor than conventionally canned vegetables. All these factors contribute to the potential economic importance of the new process.

# GLYCERINE CUSHION

**Synthetic glycerine making good as stabilizer in tight glycerine market.**

USERS of glycerine who are having trouble these days locating supplies of this versatile chemical raw material are consoling themselves with "It could be worse." It could be about 3 million pounds a month worse and stocks could be sinking to dangerously low levels.

Shell Chemical Corp.'s synthetic glycerine plant in Houston, however, is living up to advance notices as a stabilizing factor in this commodity market (*CI, September 1948, pp. 374-375*). It is pushing glycerine monthly production totals to near records—its estimated capacity is 36 million pounds a year—and a critical shortage hasn't developed despite current strong demand.

Moreover, price gyrations previously characteristic of glycerine, when all of it was a by-product of soap kettles or fat splitters, have not occurred since the price fell 15 cents a pound last spring to the present level of about 25 cents. This adjustment was attributed to lower prices for fats and oils, a slump in some glycerine-consuming industries, and an attempt to meet the price of the synthetic, reportedly going to contract customers at under 24 cents a pound.

### Sharp Pickup

Consumption of glycerine during September, October, and November (last month for which figures are available) was running over 19 million pounds—in terms of disappearance of glycerol (100% basis). This was in sharp contrast to January of last year when only 11 million pounds disappeared, and was a rate that hadn't been reached since the previous January.

Production data for crude glycerine (in which synthetic production has been included by the Bureau of Census since June) show 19, 20, and 18 million pounds for September, October, and November respectively. That 20 million level hadn't been hit in 20 months, and was a sharp upturn from the 14-15 million range early in the year.

Big factor in the heavy demand was a marked increase in alkyd resin production. From the year's low of 15 million pounds in February, these synthetic coatings showed a continuous gain to exceed 21 million pounds in September. Ester gums manufactured from glycerine also spurted from 1.6 million pounds in January to almost 2.5 million in September. Since these two outlets account for about 25% of glycerine consumption, their rate of activity greatly influences the market. Other large consumers that have held up well are tobacco (17%), cellulose films and meat casings (12-14%), and dentrifices and toilet articles (8%), while dynamite and nitroglycerine (17%) have probably been adversely affected by strikes in the mining industry.

### Dented by Detergents

Continued growth of synthetic detergents at the expense of soap has deprived the market of by-product glycerine, and it really is this slack that the petroleum-based glycerine is taking up. According to the census of the Association of American Soap and Glycerine Producers, non-liquid soap sales for the first three-quarters of 1949 totaled 1,948 million pounds, as contrasted with 1,944 million and 2,017 million for corresponding periods in 1948 and 1947. But last year's figures were based on reports from 92 companies, and the other years, on 60 and 61 respectively. Reports from 56 companies that have regularly supplied sales figures give a better basis for comparison: 1,872 million in first three quarters of 1949; 1,937 in 1948; and 2,001 in 1947.

Sales of synthetic detergents for the same period of 1949 were reported at 514 million pounds for some 35 manufacturers.

### Low Stocks

Although stocks of glycerine have generally run lower than the "safe" level of 50 million pounds for the past several years, the 37.1 million pounds on hand at the end of July was a low that hadn't been reached since the end of 1936. Heavy imports of crude in the next few months, however, bolstered stocks to 45 million pounds at November's end. Practically no foreign crude is now being offered, and stocks may dip again.

Steady consumption of refined grades shows no sign of a letup, and a continued tight market with attendant firm prices is the immediate prospect. Though the squeeze may pain a little, synthetic makes it easier to take.

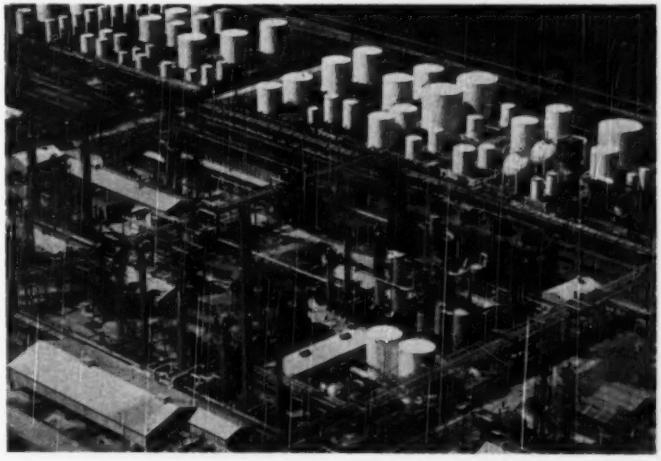
# PACKAGED PETROCHEMS

BLAW-KNOX CO. has set up a department to deal with the conversion of fuels into chemicals. It is hoped that this work, to be based initially on the Fischer-Tropsch synthetic fuels process and on related processes for making synthesis gas, will lead to engineering and construction of "packaged" units for the synthesis of valuable chemicals and oils from natural gas and possibly other fuels.

With this in mind, Blaw-Knox has just completed agreement with Ruhrchemie and Lurgi for licenses and access to all process information developed by these German firms.

Ruhrchemie pioneered the development of the Fischer-Tropsch process as used in Germany's manufacture of gasoline from synthesis gas obtained from coal. Lurgi built the plants and contributed to coal gasification.

The department will be staffed by engineers in the company's Chemical Plants Division.



SHELL'S SYNTHETIC GLYCERINE: Easing the squeeze.

HAL SCHAFER: Here he goes again.

## BLITZ BREWS

**Gold Seal Co. enters floor wax field on national scale.**

FLOOR WAX manufacturers are bracing themselves for a hurricane. Hal Schafer, president of Gold Seal Co. and the household specialties field's golden boy (Glass Wax and Wood Cream), is at it again. Rested and tanned from a Florida vacation, he's about to tackle the national "no rub" floor wax field with his original product, Gold Seal Self Polishing Floor Wax, that has been sold in eight Upper Midwestern states for seven years.

There is no doubt that this time he has picked a lot tougher nut to crack than the glass cleaner business. The market has been well exploited: The leader in the field, S. C. Johnson, is as experienced at advertising as at making wax.

### Heavy Support

Yet no one is doubting that the product will sell. The blitz advertising campaign that established Glass Wax and the continuous support it has received on the radio, in magazines and newspapers, and in point-of-purchase displays, will work for floor wax, too.

Wood Cream, the emulsion cleaner and polish for furniture and woodwork, was not as sensational as Glass Wax—probably because there was a number of such products already on the market, and furniture isn't cleaned as often as windows. However, it is still selling well, and has caused some manufacturers to push their emulsion furniture polishes, and others to start making such a product.

Liquid floor wax has a tremendous market—*The Milwaukee Journal* Consumer Analysis reported that in 1948, 82.4% of all Greater Milwaukee families bought liquid floor wax—and even a modest success means a lot of wax sales. Since it's unlikely that Schafer, who says this will be the heaviest advertising program for a Gold Seal product, will settle for a modest success, there are a few furrowed brows in the business.

### Competitive Price

The polish is a quality product, containing carnauba, and selling in the same price range as Johnson's Glo-Coat and Boyle-Midway's Old English. Packaged in a bright red container, it is fair traded at 59 cents a pint, 98 cents a quart, $1.75 a half gallon and $2.95 a gallon.

R. M. Hollingshead Corp., which makes Glass Wax and Wood Cream for Gold Seal, has been busy building inventories of the new polish for the national campaign. This association between these companies apparently is a happy one. Hollingshead has been making chemical specialties since 1888 and its Whiz brand of automotive chemicals and industrial and maintenance products has a good share of such business. Through Gold Seal it is now tapping the consumer market for glass cleaners and furniture polish, and is now going to corner a lot of floor wax sales. The rest of the household specialties industry is wondering whether there are plans for Gold Seal to promote other numbers in its own spectacular fashion, and which one in the Whiz line it might be. It looks like the blitz is here to stay.

## XYLAN FOR FILMS

**Portion of cellulose now discarded in making cellulose acetate film can also be used.**

CELLULOSE acetate manufacturers like their cellulose straight—free of the "hemicelluloses" which consist mainly of xylan, a cellulose-like polymer based on a five- rather than a six-carbon unit.

Consequently, they use high-cellulose raw materials like chemical pulp, and they'd throw up their hands at the thought of using corncobs or other such pentosan-rich materials.

Charles L. Smart and Roy L. Whistler, of Purdue's Department of Agricultural Chemistry, worried about the waste in ordinary chemical pulping. Xylan, they reasoned, is a linear polymer that should produce strong films.

### Film from the Cob

They took corncobs, which consist of about 40% cellulose, 40% hemicelluloses, and the remainder lignin and ash. The carbohydrate portion was separated from the lignin by a modification of the standard sodium chlorite process, yielding what is called holocellulose. That was separated into pure alpha-cellulose and hemicelluloses by extracting the latter with caustic.

The hemicellulose fraction in turn was separated by neutralizing the caustic solution. Down came hemicellulose A, leaving B in solution. Hemicellulose B was precipitated by dilution with alcohol.

Both fractions gave clear, strong

WHISTLER AND SMART: A was OK, but B caused trouble.

acetate films by themselves. But B acetate mixed in any proportion with cellulose acetate gave cloudy films. A acetate gave cloudy films upon admixture only when its proportion exceeded 50%.

#### Eliminating the B

It's easy enough to get rid of the B fraction, however. A short extraction of corncob holocellulose with 1-2% alkali removes it completely, and the residue gives good acetate films.

After studying these results, Whistler and Smart are convinced that pulping practice should be modified so that the high-molecular-weight hemicelluloses, now thrown away, could add their bit to better living.

## TWIN KILLERS

**Aldrin and dieldrin slated for commercial production in March.**

TWO NEW insecticides that chlordane-producer Julius Hyman & Co. developed in the fall of 1948 and christened Compound 118 and Compound 497 received new monikers just before the year's end. Now known by the coined generic names of aldrin and dieldrin, respectively (from Diels-Alder synthesis) first commercial production is expected by next month. Hyman trade names for these chlorinated napthalene derivatives are Octalene and Octalox.

Quantities from the Denver facilities will be "moderate" and are expected to meet the needs of the 1950 growing season. Hyman has made various types of formulas available for the extensive testing carried on during 1949. (Over 60,000 pounds were shipped under experimental permit in accordance with the 1947 Insecticide, Fungicide and Rodenticide Act.) The company, however, doesn't intend to become a domestic formulator, but will make the basic toxicants available to formulators as soon as recommendations for uses of the products are made and labels are registered. When the latter will be accomplished is not definite and commercial sale of the materials in finished products won't be possible until Washington gives the word.

#### Volatile One

Although the materials have had parallel careers, their properties differ. While dieldrin has a low vapor pressure and consequently has a long residual effect, aldrin is a volatile chemical. Aldrin is readily formulated as a wettable powder, emulsifiable concentrate, oil solution and low-percentage dusts. Research workers have used it in all these types of formulations. It is compatible with most agricultural chemicals.

Among groups of pests it has shown striking effectiveness in controlling are: soil insects such as wireworms, seed beetles, root maggots, rootworms, ants, roots aphids, and certain types of grubs; locusts, grasshoppers and crickets; cotton boll weevil and other cotton pests; plum curculio; alfalfa weevil and other legume pests; many varieties of ants; olive fly; fly and mosquito larvae; and several species of thrips.

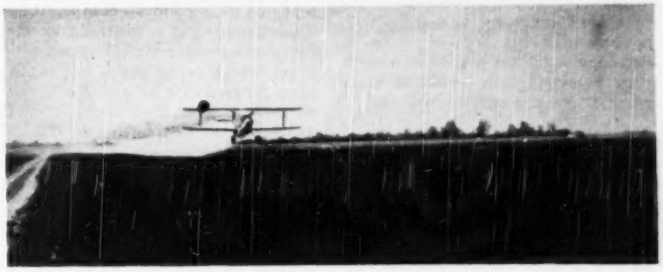
In its 1950 cotton insect control recommendations, the State Plant Board of Mississippi recommends a dust of 2.5% aldrin and 5% DDT at from 5 to 10 pounds per acre to control the bollworm, boll weevil, and other pests; and liquid aldrin at from .07 to 0.5 pounds per acre to control such insects. These recommendations are based on experiments conducted in 1948 and 1949.

At effective dosage levels, it is more volatile than chlordane, and hence is probably less of a hazard on edible or forage crops. Hay sprayed with 0.5 and 1 pound of aldrin eight days before harvest, was baled and used to feed wintering cattle, sheep and lactating cows with suckling calves. None developed abnormal symptoms nor could symptoms be found in sacrificed animals. Moreover, no aldrin was found in the milk of cows fed on the 0.5-pound hay (report on 1-pound not yet available).

#### Residual One

Dieldrin, on the other hand, is so much more residual in effect that it will not likely be recommended for pests where its residue would be a hazard on foods or forage crops. Readily formulated as a wettable powder, emulsifiable concentrate, xylene solution, and low-percentage dusts, it is compatible with most agricultural chemicals. Because of its high melting point it is particularly easy to formulate as a dust or dust concentrate in air grinding equipment.

The long residual action of dieldrin which may limit its use on food and forage is of distinct advantage in many other applications. Among pests against which it has proved effective are: adult flies and adult mosquitoes; fly and mosquito larvae; lepidopterous larvae, such as true armyworm, southern armyworm, cutworms and cotton bollworm; wide range of soil insects; Ixodid and Argasid ticks; deep-nesting harvester ants; forest tree and wood products insects; clothes moths and carpet beetle; and walnut husk fly and citrus thrips, though the latter will need more residue information before recommendations can be made.



**COTTON SPRAYING: Aldrin ready to soar.**

Dieldrin's effectiveness against adult house flies was attested to by the U. S. Public Health Service's Communicable Disease Center in Atlanta, which reported it the most effective of thirty insecticides in a series of tests conducted there. This activity combined with its outstanding performance against fly larvae at low dilution make it look like a good bet in outdoor fly-control programs.

On cotton insects, dieldrin has been tested extensively only during 1949, but it is considered very promising, and will be used again this year on an experimental basis. Both it and aldrin are effective in extremely low dosage rates.

#### Toxicity

Like other chlorinated insecticides, dieldrin and aldrin are toxic and must be handled with caution by formulators and operators. Acute toxicity has been determined for both, and chronic toxicity work is in progress. Hyman has developed a colorimetric method for determining small amounts of aldrin, and this has accelerated collection of residue data for that compound. This should help in getting commercial label registration.

# HARD BARGAIN

**Truman proposes difficult conditions for disposal of synthetic rubber plants.**

PRESIDENT TRUMAN'S advisors believe heartily in free enterprise, but . . .

The justifiable demands for maintenance of war-level synthetic rubber capacity—just in case somebody knocks a chip off somebody else's shoulder—and the more debatable demands for disposal of the industry to "small business" are formidable obstacles to quick and easy sale of the 28 rubber plants* owned by the Government.

Since rubber is compounded as much of politics as of chemicals—and high-level international politics at that—prospective purchasers will be bidding for a pig in a poke, with no way of telling how meaty he is. But because the pig may be or become very meaty, there is considerable interest in what Congress will do.

### Mandatory Use

The first barrier is the President's recommendation that he "be authorized to establish the minimum level of production and consumption" of GR-S.

That's a security measure—for it takes a certain amount of production to support continued research and to assure rapid expansibility; and the same holds true for consumption.

A related security measure is the recommendation that a designated specific capacity be maintained in standby condition—ready to roll in 90 days. Any facilities sold and converted to other uses would also have to be convertible within that time.

Hardly anyone would quarrel with the objective, but it would be tough for private industry to guarantee minimum outputs and sales. The Government would have to make the customers buy—and it would therefore have to have control over the price, quality, and terms of sale. No matter what expedients were resorted to—necessary though they be for security—the private operators wouldn't have a free hand.

### Small But Wealthy

The "anti-big" policy of Truman's advisors—whether good or bad depends on one's politics—is in any case a major deterrent to disposal; for the logical buyers—the present operators—aren't invited to the party. Practically all of them are "big," and by buying the rubber plants they would have an integrated set-up whereby they could achieve some operating economies. But the recommendations abhor integration.

Steelman* admits that the buyers must be financially responsible and technically knowledgeable, and says that "the program involves facilities and operations of a magnitude which cannot usually be handled by firms ordinarily included within the definition of 'small business,'" but "every effort should be made, through special inducements . . . , to sell a maximum number of plants to nondominant firms."

The ideal buyer, then, is a small company with lots of money, who knows how to make rubber, but isn't in the field.

### Natural's Threat

Assuming such buyers can be found, what will they get? In that imponderable question lies the thrill of possible profits or capital down the drain. The question simply boils down to whether synthetic rubber can compete with the natural product under free market conditions.

There's hardly any question about special-purpose synthetics. Their superiority for specific uses assures them a fighting chance in the competitive rough-and-tumble.

But GR-S, in spite of all the progress that has been made in improvement of its properties, is still having tough sledding in competition with natural. Best proof: After mandatory use of GR-S in tires was cut from 33⅓% to 25% last September, actual proportion of GR-S used declined from 36% (January-September) to 29% (estimated fourth quarter).

Much of the preference for natural can be laid to prejudice against synthetic as a result of the early inferior product, but a good part of it is due to the acknowledged superiority of natural for many uses.

Natural rubber, moreover, is the largest single dollar-earner for the British Commonwealth, and the British would fight desperately to retain their grip on the market. Natural has sold for as little as 4¢ a pound (1932), and while it probably will never go that low again, it could still be reduced from its present 18¢ level to meet or better the selling price of synthetic.

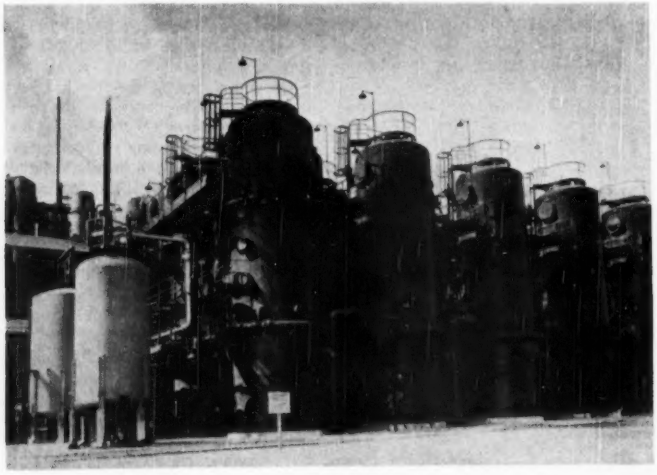
Besides, from our foreign-policy standpoint, every dollar earned by Europe and Asia on natural rubber is a dollar less of American aid needed. The State Department, therefore, is anxious to keep imports high.

### White Elephants?

But even if Congress gives the green light, it is doubtful that all of the plants—and the report concedes that several are economically unattractive—will find ready bidders. In spite of the report's apotheosis of a free economy, the Government may not be able to extricate itself entirely. Private industry can't afford the hay for white elephants—especially if they're ailing.

* 13 GR-S plants, design capacity 600,000 long tons; 2 butyl plants, 68,000 long tons; 10 butadiene plants, 489,200 short tons; 1 styrene plant, 25,000 short tons; and 2 miscellaneous plants.

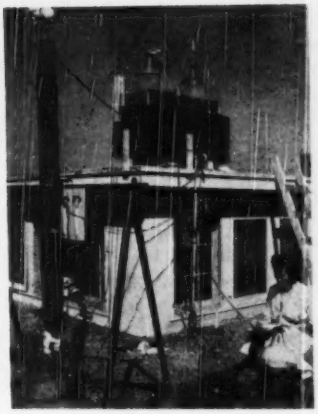
* John R. Steelman, Assistant to the President, whose "Report to the President on the Maintenance of the Synthetic Rubber Industry in the United States and Disposal of the Government-Owned Synthetic Rubber Facilities" was the basis of Truman's report to Congress last month.



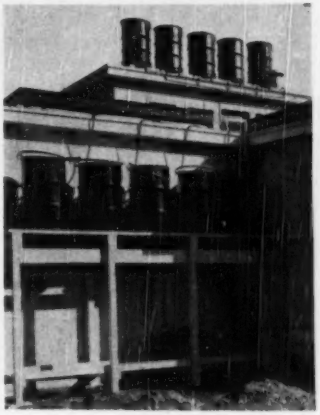
STAND-BY PLANT (at Louisville, Ky., for alcohol butadiene): Some are white and ailing.

## Steps in Chlorella Culture Development at Stanford Research Institute

**FIRST** the aglae were grown in batch set-up, here checked by Paul Cook, project leader.



**THEN** a continuous sunlight reactor was built to study effect of angle of light.



**NOW** simulated conditions in large tank farm are carried out in this roof-top pilot plant.

# BETTER THAN FARMING?

**Continuous tank culture of high protein algae gives 130 times protein yield of soybeans. Costs high for U.S., but may be practicable for arid areas.**

AS A chemical plant for converting the sun's rays into food energy, a well-run farm is roughly 0.3% efficient at best. And that best occurs for only several weeks prior to harvesting. The sunlight falling on the land during the rest of the year is wasted.

That's why a group of chemists and chemical engineers at Stanford Research Institute, Stanford Calif., think they are on the trail of something with *Chlorella pyrenoidosa*, a fast-growing, single-cell edible alga high in protein.

### Good to Better

Chlorella is no newcomer to the botanical sciences. What's new is that with it the Stanford researchers have succeeded in using on a pilot plant scale over 2% of available solar radiation to produce organic matter. That's about seven times as good as the best farmers have been able to do, and the Stanford chemists believe they are just getting started.

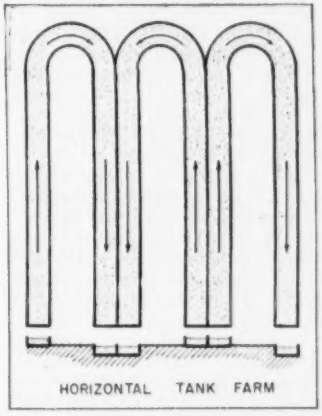
They have already proved that under sustained operation and good light conditions Chlorella can produce 44,000 lbs. of protein per acre as against 336 lbs. for soybeans, the highest-protein field crop. Eventually, they believe, this yield for Chlorella can be at least doubled.

A plant to perform these miracles will come high, however. That much the Stanford scientists are sure of, even though they are still in the process of arriving at the probable figure. A guess of about 20 cents per pound of protein for combined operating and amortization costs has been mentioned, but it is expected to be another month before any well-grounded estimate will be available.

Meanwhile the work on Chlorella is being followed closely by several U. S. companies. Big food producers like General Mills find it prudent to keep a watchful eye on any important dark horse in the food field. Others, like Commercial Solvents, are interested in chemical and pharmaceutical byproduct possibilities. One interesting byproduct produced in small quantities is sterols, derivatives of which are the basis of one of the new anti-arthritic drugs.

### 50%-Plus Protein

Work on Chlorella in connection with photosynthesis goes back about eight years. Drs. Harold A. Spoehr and Harold W. Milner of the Carnegie Institution of Washington, Plant Physiology Division at Stanford University, started some basic studies which showed that the chemical composition of Chlorella could be controlled. Under one set of conditions, having to do principally with the nitrogen content of the culture medium, a product containing over 50% protein could be obtained, while under other conditions a product could be obtained having as high as 85% fats.




**NEXT** step may be design of large-scale plant with U-shaped continuous reactors like these.

Learning of Spoehr and Milner's work, Research Corp., New York, became interested in the possibilities of Chlorella as a food source. It engaged Stanford Research Institute to look into the subject from a practical standpoint and consider methods and problems involved in developing a large-scale process.

### Continuous Radiation

The Stanford group, under project director Paul M. Cook, has worked out a process in pilot plant involving continuous operation. A mixture of fresh and recycle culture medium is fed

continuously into shallow glass-covered culture tanks exposed to the direct rays of the sun. The culture harvest is drawn off continuously from the far ends of the tanks, and separated from the spent medium by flotation and centrifuging.

In the pilot plant the culture tanks consist of shallow rectangular pans. A design that has been recommended for large-scale operation is shown in the accompanying sketch. This comprises a battery of U-shaped pans, each of which extends to the end of the farm, turns, and comes back to its origin at a slightly lower level to provide gravity flow. Optimum growth conditions are maintained by holding the temperature in the tank between 20 and 25°C and introducing fresh medium at frequent intervals along the length of the tank.

A necessary condition for optimum growth is turbulence or agitation so that all of the Chlorella cells will be subjected to the same amount of light and so that equilibrium conditions will be maintained between the necessary nutrients and each cell. This is accomplished by recycling enough of the culture to obtain a condition of turbulent rather than streamline flow in the tanks.

An atmosphere of carbon dioxide and air is maintained over the culture. In large-scale operation it is expected that waste combustion gases from the medium sterilization and culture dehydration processes will supply enough carbon dioxide for growth requirements.

In addition to light, water, and carbon dioxide, the raw material requirements for growing Chlorella consist chiefly of fixed nitrogen, as either ammonium or nitrate ion, and certain trace elements for the mineral nutrient solution. Cost of nutrients is about one cent per pound of Chlorella.

### Food Value

Work to date on the nutritional value of Chlorella has been limited. However, preliminary nutrition studies with rats and chickens indicate that the product gives good results where used as a feed supplement. Where it is the sole diet, fortification with one of the amino acids may be necessary.

Although it appears to be of greater long-term than immediate significance as far as this country is concerned, the Stanford work has shown that photosynthesis can be used and controlled in a simple industrial process. Continuation of the project, as is planned, will doubtless provide additional important information.

# NOT ONE CHESTNUT

**Army Quartermaster tests show synthetic tan can completely replace vegetable tans.**

FIVE years have gone by since Rohm & Haas brought out Orotan, a synthetic tanning agent based on a condensed phenolic sulfonic acid. Small-scale tests indicated that it could satisfactorily replace natural tannins.

A couple of years ago the Army Quartermaster Department started to worry: About two-thirds of the tannins used in this country are normally imported, and therefore vulnerable to stoppage in case of war. Could synthetics be relied on completely?

The Quartermaster General got busy. He ordered 16,000 pairs of synthetic-

H. G. TURLEY: No bare feet.

ally-tanned shoes. Rohm & Haas agreed to supply the tan, which was developed by its leather expert H. G. Turley. U. S. Leather Co. contracted to make the leather at the experimental Eagle Valley Tannery of its subsidiary, Keystone Tanning & Glue Co., Inc. And General Shoe Co. accepted bids to make the shoes.

The project, started last Fall, was just recently finished. In the test 1,000 hides weighing about 71,000 lbs. consumed about 78,000 lbs. of the tanning agent (equivalent to some 24,000 lbs. of tannin) during the processing. Some of the conclusions: Using normal tanning practice, better control was achieved and fewer difficulties encountered; the yield and quality of leather was satisfactory.

### Used in Blends

Syntans (synthetic tanning agents) have been used commercially for several years, but they have usually been blended (in amounts of 20-30%) with natural materials, especially for sole leather, where relatively larger amounts of tanning agents are required.

The reason for that is high cost—the syntans' vulnerable point. The three dominant natural tanning agents—chestnut, quebracho, and wattle—are cheap, whatever their drawbacks.

But those drawbacks are the bright hope of the synthetics. The chestnut tree, as a result of the blight, is going the way of the dodo and the passenger pigeon. Quebracho (for which drilling muds also compete) and wattle are imported. Thus, they are subject not only to the thousand natural shocks that natural materials are heir to—fat and lean years, quality variation, harvesting hazards, etc.—but also to the vagaries of foreign politics, shipping irregularities, cartels and all that.

### Hopeful Future

Oroton wasn't the first nor is it the only syntan currently used. What this test proves is that a non-vegetable tan, operating under normal tannery conditions, can fulfill exacting military requirements. American soldiers (if they spurn plastic soles) will not have to fight, like Washington's men, in bare feet.

But for normal leather use, the syntans will have to slug it out with the vegetable materials. Uniformity of product is one point for their side. Less trouble in the tannery is another. Other points which may be won in the future are lower cost, either of the syntans themselves or the tanning process, and superior leathers. Victory on either or both of these scores would assure the syntans of a secure and growing market.

# IONS FOR SPRAYING

A novel industrial application of radioactive isotopes is being pushed in the laboratories of Metallisation, Ltd., Dudley, England.

Molten metal is applied to surfaces as a protective coating by means of an electric arc pistol. An arc is struck between two metal wires fed into the pistol. The heat of the arc melts the metal, and a blast of air blows the metal away in the form of a spray. The catch: Ordinary air, since it is not conductive, disrupts the arc. The solution: The air is ionized, making it conductive, by first passing it over radioactive phosphorus.

The radioactive isotope is "home-grown"—a product of Britain's atomic energy station at Harwell.

# FOUR FOR TWO

**Papermakers' chlorine-caustic plants can also supply sodium sulfide and hydrogen peroxide.**

PAPER MILLS are where wood and water can be found—often miles from industrial centers where chlorine, for pulp bleaching, can be obtained. Thus they often install their own electrolytic cells for chlorine-caustic soda manufacture, both of which they use. But, like all chlorine-caustic producers, they frequently have trouble balancing the demand for the two products.

Now come D. W. Hengerer and R. B. MacMullin with some suggestions. Several recent developments, they contend, should persuade pulp and paper producers to re-examine the chlorine-caustic phase of their operations. Their suggestions are pointed particularly to makers of bleached kraft pulp (a chlorine consumer), bleached groundwood (a hydrogen peroxide consumer), or a combination of the two. Hengerer and MacMullin would utilize the usual excess of caustic soda as a raw material for sodium sulfide, thus reducing purchases of salt cake (sodium sulfate) for kraft pulping. In addition, they would produce hydrogen peroxide, for groundwood bleaching, concurrently with caustic soda.

A bleached kraft mill making its own chlorine will produce about 30% more caustic than it needs, but it must purchase salt cake. Often it would be cheaper to bypass salt cake, purchase elemental sulfur, and save the freight on the unused portion of the salt cake molecules.

### Sodium Sulfite

There are many possible ways of utilizing caustic and sulfur. The sulfur may be burned to sulfur dioxide, which is then absorbed by a caustic solution to form sodium sulfite. The solution could be spray-dried and the solid sulfite charged to the salt cake reduction furnace, or the solution itself—subject to proper control of concentration—could be charged directly. Since the sulfite is in a lower oxidation state than sulfate, the reduction load on the furnace would be less.

### Sodium Sulfide

An even better method is to convert the caustic soda directly to sodium sulfide and bypass the reduction furnace completely. Two means of doing this are now in operation.

One, patented by Hooker Electrochemical Co., combines electrolytic cell hydrogen with sulfur in a catalytic vapor-phase reaction to give 90% conversion to hydrogen sulfide per pass. Excess sulfur is condensed and removed, and the final traces are eliminated by a countercurrent wash with sodium hydrosulfide solution. The product gas from this wash is then absorbed in caustic soda solution. This process has one major advantage over all other methods: easier control over the sodium/sulfur ratio in the digesting liquor.

HENGERER AND MACMULLIN: Declaration of independence.

Second, if an amalgam cell is employed in the plant, the patented process of Lanzetti and Achille may be considered. This has operated on pilot-plant scale in Germany and the United States and on a commercial scale in Italy. It superimposes sodium sulfide production upon a standard mercury cell chlor-alkali plant with only a slight additional capital expense.

In operation a sodium polysulfide solution is substituted for water in the decomposer section of the amalgam cell where the caustic soda is usually formed from the amalgam. Sodium polysulfide is given by the reaction of a portion of the sodium sulfide formed with elemental sulfur. The "poly" segment of the sodium polysulfide molecule reacts with the sodium amalgam to make additional sodium sulfide.

### Peroxide for Groundwood

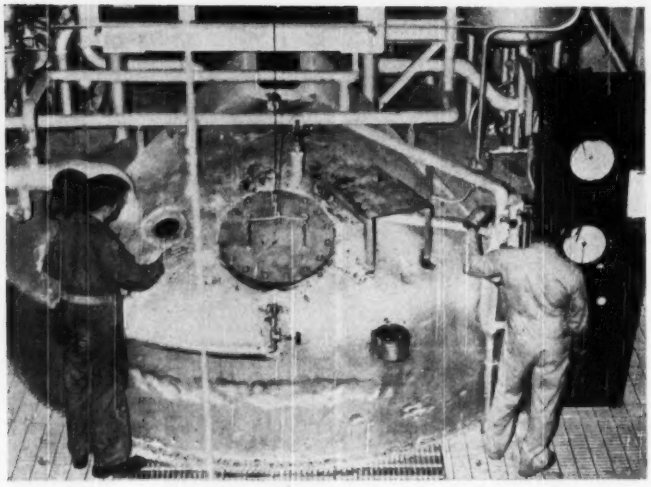
An expansion in the use of peroxides for the bleaching of groundwood pulp is long overdue. High price has slowed adoption of hydrogen peroxide, while sodium peroxide has been available only in limited quantities (*CI, Nov. 1949, p. 714*). Hengerer and MacMullin suggest production of hydrogen peroxide on the spot, also from sodium amalgam, by Mathieson Chemical Corp.'s process. (They estimate that this peroxide would cost slightly over 25¢ per pound on a 100% basis. In comparison with sodium peroxide this would allow a reduction of about 30% in the cost of groundwood bleaching.)

A reducer section is substituted for the decomposing chamber, where caustic soda is usually formed from sodium amalgam. The amalgam is contacted with water and azotoluene dissolved in ditolylethane. Two reactions occur simultaneously in the reducer: A caustic soda solution (about 25%) and nascent hydrogen are produced from sodium and water. The hydrogen in turn reduces azotoluene to hydrazotoluene.

The water and hydrazotoluene layers are separated by centrifugation and the hydrazotoluene fraction further washed with water. It is then oxidized with oxygen gas to form azotoluene and hydrogen peroxide. The latter is extracted with water. Control of the quantity of water used permits production of any desired strength of hydrogen peroxide up to about 50%. The azotoluene is then recycled for production of further hydrogen peroxide. The only losses are mechanical.

Azotoluene is produced initially by reduction of *p*-nitrotoluene with sodium amalgam. This is usually carried out in the amalgam reducer. Ditolylethane is synthesized from acetylene and toluene and is inert to all materials which it contacts.

Use of these procedures could very well mean independence of outside supplies for many pulp producers. It could also mean more economical utilization of raw materials and lower-cost pulp and paper production.



A 15,000 gal. fermenter for producing streptomycin at Merck's Elkton, W. Va., plant.

# ANTIBIOTICS

by R. D. PETTY,*
New York, N. Y.

**FERMENTATION is still more art than science. Maintenance of a pure strain of living organisms, rapid growth, and high product yield require exacting conditions — all in addition to ordinary plant problems.**

INDUSTRIAL fermentation has often been described as a dying industry. Today the value of the products formed is larger than ever. It is true that its use for the old standby products, ethanol, butanol, and acetone has failed to increase except during the war years. However, the unit process, fermentation, has rapidly expanded into new fields, principally production of such antibiotics as penicillin and streptomycin, and the vitamins, C, $B_{12}$, and riboflavin.

Production of penicillin and streptomycin in 1948 was 95,855 and 37,710 billion units respectively[19] and the quantity of the latter product will be more than doubled in 1949[11]; the current annual value of these two products alone exceeded $175,000,000. Aureomycin, bacitracin and chloromycetin among others are also in large scale production. Recent publications[12] and reviews[1, 22] describe over 175 antibiotic substances. Since most of this work has been done by commercial firms the number which have been considered is probably much larger.

## CHEMICAL SYNTHESIS?

Can these antibotic materials be produced by chemical synthesis? Fermentation acetone, butanol, ethyl alcohol and riboflavin certainly face strong synthetic competition, but chloromycetin is the only antibiotic made by both chemical and biochemical methods on a commercial scale.[23] The penicillin molecule is so complex that, as yet, no competitive synthetic process has been developed. Thus it would seem that many antibiotics will continue to be manufactured biochemically.

Penicillin production today is highly competitive. Improved strains, substrates and modifications in equipment and operating procedures have rapidly lowered the selling price. Penicillin at one time sold for $20 per 100,000 Oxford units. Now very large consumers may purchase the same quantity for as low as 4½¢. At this price, a highly efficient process is necessary to show a profit and as the situation tends to approach mycological and biochemical stability further economies from improved chemical engineering design will be necessary. Current batch methods are highly inefficient and true continuous operation does not appear impossible.

## NEW PROBLEMS

The chemical engineer going into this field for the first time will encounter concepts common to no other processing field. Here compounds are produced by biochemical synthesis either within the living cell or by enzyme-catalyzed reactions outside the cell. In either case, a living entity is involved. Each organism varies widely in its reaction to free oxygen, growth requirements, ability to ferment raw materials, and these factors, foreign to other syntheses, must be considered in design. There is no sharp line of demarcation between the microbiological and engineering aspects.

Not only must chemical and physical factors associated with the organism's growth be considered but some understanding of its physiology is essential for intelligent design. To illustrate this point consider the problem of mutation. Over 100,000 species of fungi have been described and among species there may be a large number of types or strains. Even in so-called "pure strains", variations occur under different environmental and nutritional conditions.[8]

Only a relatively small percentage of these fungi species are now used for biochemical synthesis but the possibilities are still very great. By subjecting a given species or strain to ultraviolet irradiation, X-rays, heat, or certain chemicals it is possible to produce new strains, mutants, varying markedly from the parent in ability to produce the desired product. Indeed such mutants are the basis of many fermentations. These improved functional characteristics are often unstable and tend to disappear rapidly in commercial operations, lending a degree of instability not common to other syntheses. Foster[7] described an ultraviolet-induced mutant capable of producing 3,000 Oxford units of penicillin per milliliter. This is more than twice that produced by good commercial operation. An obvious possibility in continuous processing would be to recycle a portion of the mycelium or cell growth from the finished fermentation to the fresh charge for rapid seeding. This presupposes an organism of constant physiological properties which is seldom the case. Whiffen,[34] working on penicillin, shows that functional degeneration can largely, if not entirely, be eliminated by excluding miscellaneous spores from the seeding operation.

## PROCESS

Industrial fermentations employing yeasts, molds[3] and bacteria[9] for producing chemicals by enzyme catalyzed reactions may be classified into two groups according to oxygen requirements; the aerobic, needing free oxygen, and anaerobic, those that do not. This article is concerned with the first

* Mr. Petty is a consulting engineer and is working with Sanderson & Porter, Inc. on fermentation problems.

# Pace Industrial Fermentation Revival

group which includes production of penicillin, streptomycin, aureomycin and many others. Since surface methods of culture, the first-used, are largely outmoded for commercial work, they are disregarded and only the now-used "deep-tank" or submerged processing is described.

From an engineering viewpoint the broad outlines of all submerged aerobic fermentations are similar and the discussion will be restricted to this phase of the operation, as great differences in the chemical constitution of the finished products necessitate widely divergent refining procedures.

Silcox and Lee[26] and Lee[19] have considered various factors influencing the unit process of fermentation. Commercial production of penicillin,[32] streptomycin,[24] and chloromycetin[23] have been described. Here some of the factors affecting design of a fermentation unit for production of chemicals under pure culture conditions will be considered. The fundamental chemical and physical relationships between organism, substrate and air are still so obscure that most information must be secured by trial and error and no pretense is made that suggested design features represent the optimum in every case. While penicillin will be considered specifically examples from other fermentations are cited for illustrative purposes.

Any fermentation process starts with the laboratory preparation of the seed inoculum from a pure culture, usually maintained in a dormant stage on sterile earth. Agar slants and smears are incubated from this material and successive incubations of test tubes, flasks and, finally, 5 or 10 gallon bottles are carried out under aseptic conditions.[10] The size of the final laboratory stage is usually controlled by the physical limitations involved in handling the container since the next step is the inoculation of the first plant seed stage. The importance of maintaining aseptic exterior conditions at this point cannot be too strongly emphasized for it is here that contaminations often occur.

## SEEDING

The first plant seed tanks should be located in a room adjacent to the laboratory, isolated from the plant as a whole. This room should be maintained under a positive pressure of sterile air, provided with ultraviolet lamps and floors and walls of a smooth hard finish capable of withstanding disinfecting operations.

## AEROBIC FERMENTATION PRODUCTS

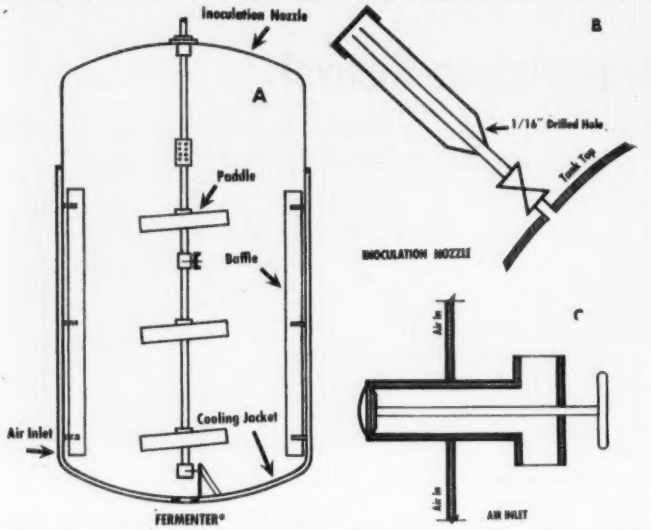
| | Aureomycin | Bacitracin | Chloromycetin | Citric Acid | Penicillin | Sorbose | Streptomycin | Vitamin $B_{12}$ |
|---|---|---|---|---|---|---|---|---|
| Abbott Laboratories | | | | | X | | | X |
| American Cyanamid Co. / Lederle Laboratories Div. | X | | | | | | | |
| J. T. Baker Chemical Co. | | | | | X | | | |
| Bristol Laboratories | | | | | X | | | |
| Commercial Solvents Corp. | | X | | | X | | | |
| Cutter Laboratories | | | | | X | | | |
| Heyden Chemical Corp. | | | | | X | | X | |
| Hoffman-LaRoche Inc. | | | | | | X | | |
| Eli Lilly & Co. | | | | | X | | X | |
| Merck & Co. | | | | | X | | X | X |
| Parke-Davis & Co. | | | X | | | | | |
| Chas. Pfizer & Co. | | | | X | X | | X | X |
| Schenley Industries, Inc. | | | | | X | | X | X |
| E. R. Squibb & Sons | | | | | X | | X | X |
| U. S. Industrial Chemical Co. | | | | | | | | X |
| Upjohn Co. | | | | | X | | X | |
| Wyeth, Inc. | | | | | X | | | |

Olive[23] describes a method of going from laboratory to plant operations involving the use of a sterile syringe through a rubber stopper. This presupposes a comparatively small final laboratory culture. If 5 or 10 gal. bottles are to be used an inoculation nozzle must be provided and the sketch (Fig. 1B) shows a convenient design. By allowing the plugcock to remain open during sterilization of the tank with steam the entire installation is simultaneously sterilized. The cap over the nozzle is provided with a 1/16" hole to bleed steam continuously, avoiding any air pockets that might prevent the nozzle from reaching the desired temperature. The laboratory bottles have the usual glass tube and rubber hose connections and at the time of inoculation the nozzle cap is screwed loose, the hose connected and the transfer made by sterile air pressure.

Only one seed tank is shown in the flow diagram (Fig. 2) although the number of plant seed stages varies with size of the laboratory inoculum, the size of the final fermenters, and the rapidity of cell growth. For the Merck operation with 15,000 gallon fermenters, Lee and McDaniel[18] show about 10% inoculum. The larger the final plant seed stage the shorter the final fermentation cycle but since the rate of cell growth is to some extent a function of the organism used, economics will govern the number of plant seeding stages. Plant seed tank charge varies from 5 to 10% in commercial work with the latter figure favored.

## SUBSTRATE MAKEUP

Discussion of the flow sheet starts with preparation of the medium or substrate to be fermented. Two factors must be considered; rate of cell growth and antibiotic production. Nutritional requirements for optimum conditions may be quite different. For penicillin glucose is the carbohydrate choice for cell growth and lactose for maximum production. Corn steep liquor is the source of nitrogen in either case.[4] In the seed stages where primary interest is cell growth glucose would be used but in the final fermentation where cell growth and antibiotic production proceed simultaneously a compromise must be reached. A typical formulation is: 1% glucose, 3% lactose, and 3% corn-steep liquor (dry basis). Sufficient calcium carbonate is added




The fermenter* (Fig. 1A) is fitted with an inoculation nozzle (Fig. 1B) at the top and an air inlet (Fig. 1C) on the side.

to bring the pH to 6.8 at the start.

One objection to the use of any natural product in the substrate, in this case corn-steep liquor, is variation in fermentation yields with variation in the raw material source. This has led to a search for a production medium free from such variable raw materials, a so-called "synthetic" substrate.[31] Many combinations of organic and inorganic chemicals have been proposed. In general, yields are much lower than where corn-steep liquor is utilized. Apparently corn-steep contains trace elements, as yet unidentified, essential for the optimum production. The chemical makeup of the substrate has a direct bearing on sterilization as will be shown later.

In addition to carbon, nitrogen, magnesium, potassium, phosphorus, sulphur, etc., certain metallic trace elements are usually required for nutrition. One part per billion exerts a stimulating effect in certain cases.[30] The required trace materials may be supplied as contaminants from the materials used in preparing the substrate or added to the medium. In either case, requirements are established by the laboratory and do not particularly concern the engineer. Conversely, metallic trace materials may act as poisons and retard or stop the fermentation entirely. This does concern the engineer since these poisons may originate from the materials of construction. The nature and allowable concentration of such materials must be carefully determined in advance so that materials of construction will not produce inhibitors by corrosion. Stefaniak[28] working with penicillin finds no loss in yield attributable to the dissolved iron from steel fermenters.

* Patented mixer design of Turbo Mixer Corp., used by over 80% of the industry.

## PRECURSORS

Organic precursors or adjuvants,[2] organics added prior to or concurrently with fermentation, secure either or both increased yields or improvement of product quality. The chemical formula of penicillin $C_9H_{11}O_4SN_2$ - R represents many possibilities depending on the substituent R. In commercial work the benzyl substituent (Penicillin G) is usually the desired product. Since Penicillin G yields phenylacetic acid on degradation, Moyer and Coghill[21] proposed that this material be added as a building block for the penicillin organism during fermentation. Concentrations used vary from 0.3 to 0.7 g. per liter, the transfer being affected by sterile air pressure from a tank above the fermenter. Automatic equipment for this operation is costly. For this reason manual control is usually employed. Brown and Peterson[4] report that (in 30 l. experimental fermenters) under carefully controlled conditions use of this material as a precursor yields 2,000 units per milliliter, analyzing 97% Penicillin G.

The type and quantity of enzymes produced in any metabolic process are influenced by the pH of the medium, the optimum being a function of the individual process. No fermentation is known to the writer where overall yield and quality cannot be improved by pH control. In citric acid production Karow[16] maintained a pH below 3.5 with calcium carbonate, increased the yield of citric acid and repressed production of oxalic acid. For penicillin, Jarvis and Johnson,[13] for a synthetic medium, report optimum cell growth occurs at a pH of 6.8 and product at 7.3. Also they choose the substrate ingredients to correlate fermentation rates with ion production and consumption, securing a pH adjustment within the process itself. A similar approach might work in many cases but on a commercial basis it would be cumbersome. The addition of acid or alkali is easier and less expensive.

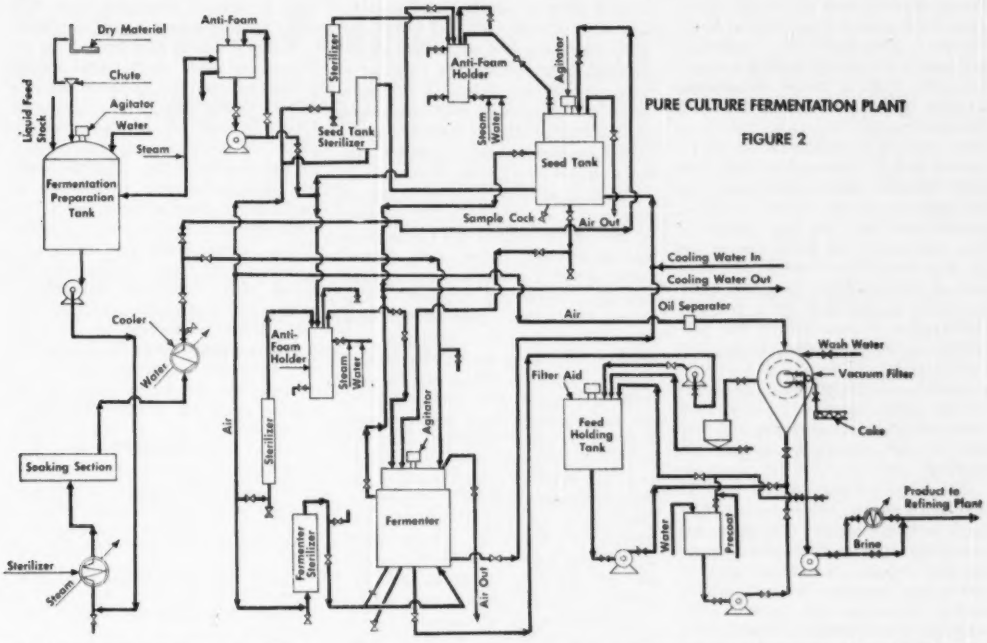
Olive[23] describes a method of pH adjustment for chloromycetin production. This involves intermittent and presumably manually controlled introduction of acid into the fermenter. A sample from the fermenter is circulated continuously by a diaphragm pump over a pH cell which actuates a recorder and could operate a valve automatically.

## FLOW OF MATERIALS

The ingredients (Fig. 2) are brought into solution with 30 to 40% of the total water required. A closed vessel (Fig. 1A), provided with mechanical agitation and means for warming the solution, is used. Deionization will control the water purity. The entire fermentation system is sterilized with 15 lb. steam during the preparation of the batch and unsterilized mash pumped directly to the sterilizer where the temperature is raised to 275° F. A shell and tube unit is shown in flow sheet although ethyl and butyl alcohol practice[5] utilizes a steam jet. In either case a small tank to insure maintenance of temperature for 2 to 3 minutes is interposed between the heater and cooler, a water cooled tubular unit. A back pressure valve on the outlet side of the cooler maintains the mash in the liquid phase during this operation.

In many plants employing natural products such as corn steep liquor or meat extract, sterilization involves heating the entire batch to about 250°F for thirty to forty minutes and then cooling to fermentation temperature with either coils or jackets. For many substrates this degrades some of the essential factors and reduces yield since surface-volume relationships necessitate a long time at temperature. Higher temperatures are more effective if the time interval is reduced.

In the sterilization section, the piping system and fermenter proper, it is essential that the portion of the system to be maintained in aseptic condition be kept under positive pressure with relation to the rest of the plant. This may be accomplished with sterile




PURE CULTURE FERMENTATION PLANT

FIGURE 2

air or steam pressure but in either case, leaks should be towards the non-sterile portion of the plant. Floating tube bundles are employed in the sterilizer and cooler to allow for expansion involved in alternate heating and cooling.

After the mash is charged to the fermenter sufficient water is flushed through the system to bring the fermenter charge to the proper concentration. Any residue in the lines is blown to the fermenter by sterile air. Pumps equipped with stuffing boxes should be avoided on the sterile side of the process as glands offer an added chance for contamination. Sterile air can be used for liquid transfer. Plug cocks are preferable to valves for the same reason. Piping should be so designed that pockets and dead ends that might hold up unsterile air or liquid are avoided. If low spots in the lines or pockets are unavoidable they should be vented and a small amount of steam bled through the vents for sterilization.

Welded construction should be used wherever possible on the piping. If flanges must be used, alloy steel bolts should be employed. Alternate heating and cooling tends to loosen carbon steel bolts.

Since the sum of the chemical reaction in the fermenter is exothermic, means must be provided for heat removal. External jackets or internal coils are obvious choices. Internal coils give smaller cooling surfaces and probably lower water consumption but complicate the mixing and sterilization operations. The jacketed fermenter is not open to this objection and if the water is introduced tangentially and proper baffling installed between the vessel proper and the jacket, water use is comparable to internal coils.

## AIR INTRODUCTION

The quantity of air and method of introduction into the fermenter is critical. The efficiency of this operation in commercial plants is low, 1-15%.[18] Usually air is introduced through a mechanical comminutor. A mechanical agitator maintains the desired degree of dispersion. The comminutors used may be pipe spargers drilled with fine holes,[28] carbon or carborundum elements, and devices such as the one manufactured by the Pfaudler Co. (Fig. IC). Carbon or carborundum diffusers are satisfactory for some fermentations but cannot be used with penicillin as they tend to plug. Pipe spargers are the most widely used but they must be kept free from mash at all times. Any growth within the coils rapidly plugs the holes, and to some extent they complicate the operation of the mixer. The Pfaudler diffuser shown in Fig. IC is externally mounted on the tank. Since it is easily sterilized, non-plugging and does not interfere with the agitator operation it is preferred.

In another type air enters the fermenter through an open pipe terminating at the bottom, the agitator alone creating and maintaining dispersion. In the German-developed Waldhof fermenter[25] a hollow shaft carried the agitator impeller and air was introduced through this directly into the agitator stream. No published data on plant scale operations for these two methods are available.

It has been suggested that an increase in efficiency might be secured if fermentation were carried out under moderate pressure, thereby increasing the oxygen concentration in the substrate. Reduced fermentation cycles have been reported on gluconic[20] and citric acid[16] although Stefaniak, et al.[29] report that a pressure of 40 psi retards penicillin production. The use of pressure or free oxygen should be carefully considered in connection with each new fermentation since it may reduce the long fermentation cycles that have retarded use of continuous methods.

Air is usually sterilized by the procedure used in laboratory operations, passing the air through sterile fibre. Since cotton is apt to be wet during sterilization, glass wool or activated charcoal is used in plant operations.[34]

Other methods used for sterilization

are: The compression of the air under adiabatic conditions which raises the temperature enough to kill all organisms if adequate holding time at temperature is provided.[19] The compressed and cooled air may be washed countercurrently with a strong disinfectant solution such as chlorinated phenol. Precipitrons and ultraviolet light have been tried on a small scale but as yet are not widely used commercially. The latter methods usually presuppose that the entire air system can be kept under aseptic conditions for long periods of time and present the possibility of loss of an entire series of fermentations in case of failure. With individual units, as shown in the flow sheet, frequent sterilization is possible and the possibility of contamination from plant air eliminated. At reasonable velocities a 4 ft. packing depth provides sterile air for periods up to 100 hours. Such units are comparatively cheap and they may be used indefinitely without repacking.

The large volumes of air used in the later stages, where soaps produced as by-products of the process are abundant, results in considerable foaming and an anti-foam agent must be added intermittently to reduce the surface tension of the broth. A 3% solution of octadecanol in lard oil was employed in the earlier plants. More recently synthetics such as oxazolines[14] have come into wide use.

Each fermenter is provided with an anti-foam holder of sufficient capacity to provide enough material for an entire run. Its sterilization is accomplished by an outside steam jacket. The introduction of the anti-foam agent may be automatically controlled[28] by a magnetically operated valve connected to two electrodes located in the tank. A further visual check is provided by a sight glass, usually installed on the air outlet line. The transfer of the sterilized anti-foam is accomplished with sterile air pressure.

## MIXERS

The mixer is the most important fermenter accessory and lack of understanding of the fundamental factors involved no doubt account for the great discrepancy between pilot plant and plant operations where the yield data favors the former in a ratio of 2:1. This first conversion from flasks to mechanical mixers was difficult since the batch dimensional relationships, the motion of the liquor surface, and the method of surface air contact could not be economically duplicated. A new concept of mixer design requirements was required to provide for uniform distribution of fungus and air supply at the liquid-solids interface to assure aerobic growth conditions.

The need for this new design concept was further apparent when extrapolation was attempted from laboratory to pilot plant to commercial size units. The size conversion did not follow any of the regularly used methods of extrapolation. The tendency of corn steep liquor to foam precluded use of certain mixer types otherwise well adapted to this application and necessitated a design to minimize foam formation and assist in its breakdown if formed.

Accurate evaluation of the effect of mixing has not been possible because of inability to control the biochemical variables. Also, since this control varies between plants as does general operating technique, improved yields in one plant due to mixer changes will not necessarily be duplicated in another. There is no standardization of tank shape, the dimensions varying from a straight side depth 9/10 of the tank diameter to a depth of over 8 times the tank diameter. The relationship most commonly used, however, is a depth of approximately twice the tank diameter. Similarly, the energy input varies from 0.3 HP per hundred gallons of charge to approximately 2.0 HP per hundred gallons depending on the operating technique and experience of the individual company.

Various types of agitation have been tested in fermentation. Propeller types were successful in small tanks but were unsuitable for large vessels. They do not give the type of liquor circulation or of gas and solids distribution desired. The hollow blade type, both airfoil and turbine, with perforated lagging edge for air distribution was tried because of its previous application in the fermentation of yeast. For antibiotics production it was found that they could not compete with more modern mixer designs.

Several variations of the turbine impeller design have been used and most of them discarded with the exception of the open type with straight or curved blades. Over 80% of the antibiotic industry in this country and abroad have standardized on the open back-slope bladed turbine. The sketch (Fig. IA) shows the general design features of these units.

Designs involving internal cooling coils, baffles, spargers, etc. affect the mixer efficiency. These factors have been evaluated by Bissell, et al.[3]

No attempt is made to separate seed tank and fermenter operations since they are fundamentally the same. No precursor is used in seed tanks since product formation is not important and pH and nutritional conditions may be different. Mechanically the factors governing aeration, mixing, etc. follow the same lines. Seed tank cycles are lower, 24 to 48 hours, representing the usual conditions whereas the fermenters operate on longer cycles, 60 to 90 hours. Optimum conditions in current commercial work on penicillin give a yield of somewhat over 1000 units per milliliter with good operation.

Removal of the mycelium from the fermented mash is usually accomplished on rotary vacuum or pressure filters. Their design and operation should be such that subsequent clarification of the filtrate is unnecessary. In handling penicillin solutions needless operations must be avoided as they always result in losses due to the instability of the compound. With an Oliver vacuum drum filter using precoat on the filter and adding filter aid to the slurry, a crystal clear filtrate may be obtained in one operation. The cake should be washed on the filter drum to reduce losses of product in the discarded mycelium. The liquid product from the filters passes to the refining plant for product separation.

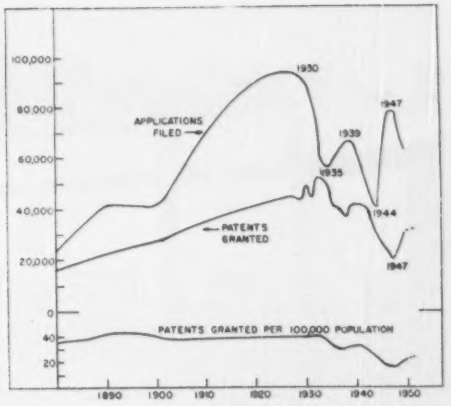
## BIBLIOGRAPHY


1. Bailey, J. H., and Covallito, C. J., Ann. Rev. Microbiol., 2, 143(1948).
2. Behrens, O. K., "Chemistry of Penicillin", Princeton University Press, Princeton, N. J. (1948).
3. Bissell, E. S., Hesse, H. C., Everett, H. J. and Rushton, J. H., Chem. Eng. Prog., 43, 649(1947).
4. Brown, W. E. and Peterson, W. H., Abstracts, (18A) 116th Meeting, Am. Chem. Soc., Atlantic City, N. J. (Sept. 1949).
5. Carnarius, E. H., U. S. P. 2,423,580.
6. Coghill, R. D., Chem. Eng. News, 23, 2310 (1945).
7. Foster, J. W., U. S. P. 2,458,495.
8. Foster, J. W., "Chemical Activities of Fungi", Academic Press, New York, N. Y. (1949).
9. Gale, E. F., "The Chemical Activities of Bacteria", 2nd Ed., Academic Press, New York, N. Y. (1948).
10. Grenfell, E., Legge, B. J. and White, T., J. Gen. Microbiol., 1, 171(1947).
11. Ind. Eng. Chem., 41, 2374(1949).
12. Irving, G. W. and Herrick, H. T., "Antibiotics", Chemical Publishing Co., Brooklyn, N. Y.
13. Jarvis, F. G. and Johnson, M. J., J. Am. Chem. Soc., 69, 3010(1947).
14. Johnson, H. G., U. S. P. 2,443,825.
15. Johnson, M. J., Ann. N. Y. Acad. Sci., 48, 57(1946).
16. Karow, E. O. and Waksman, S. A., Ind. Eng. Chem., 39, 821(1947).
17. Le Mense, E. H., Sohns, V. E., Corman, Julian, Blom, R. H., Van Lanen, J. M. and Langlykke, A. E., Ind. Eng. Chem., 41, 100 (1949).
18. Lee, S. B. and McDaniel, L. E., Abstracts, (19A) 116th Meeting, Am. Chem. Soc., Atlantic City, N. J. (Sept. 1949).
19. Lee, S. B., Ind. Eng. Chem., 41, 1868 (1949).
20. May, O. E., Herrick, H. T., Moyer, A. J. and Wells, P. A., Ind. Eng. Chem., 26, 575 (1934).
21. Moyer, A. J. and Coghill, R. D., J. Bact. 51, 57(1946).
22. National Institute of Health, Bethesda, Md., "Antibiotic Substances—Their Biological and Chemical Properties" (Feb. 1948).
23. Olive, T. R., Chem. Eng., 56, No. 10, 107 (1949).
24. Porter, R. W., Chem. Eng., 53, No. 10, 94 (1946).
25. Saeman, J. F., Locke, E. G. and Dickerman, G. K., FIAT Final Report 499, 117 (Joint Intelligence Objectives Agency, Washington, D. C.) (1945).
26. Silcox, H. E. and Lee, S. B., Ind. Eng. Chem., 40, 1602(1948).
27. Stark, W. H. and Pohler, G. M., Abstracts (21A) 116th Meeting, Am. Chem. Soc., Atlantic City, N. J. (Sept. 1949).
28. Stefaniak, J. J., Gailey, F. B., Brown, C. S. and Johnson, J. J., Ind. Eng. Chem., 38, 666 (1946).
29. Stefaniak, J. J., Gailey, F. B., Jarvis, E. G., and Johnson, M. J., J. Bact., 52, 119(1946).
30. Steinberg, R. A., J. Agr. Research, 51, 413 (1935).
31. Stone, R. W. and Farrell, M. A., Science, 104, 445(1946).
32. Taylor, T. H. M., Chem. Eng. Prog., 43, 155 (1947).
33. Teriesen, S. G. and Cherry, G. B., Trans. Inst. of Chem. Eng. (England) (1947).
34. Whiffen, A. J. and Savage, G. M., J. Bact., 53, 231(1947).

# Licensing Patents For Profits

by JOHN H. WILLS,
Philadelphia Quartz Co., Phila., Pa.

**USERS OF PATENTED PROCESSES on a royalty basis can often cut process costs and at the same time encourage inventors to extend their research efforts.**




**Understanding of patent licensing will increase applications.**

THE large-tonnage heavy chemical industry shows a low profit per pound of product. New products are relatively few and seldom command a large premium. Its main developments are in new and improved uses. It is evident that such developments cannot support a research program based on 5% of gross sales; probably 1% is as much as management can cover.

Here, then, is a pertinent question: How can management make a "use" process yield concrete returns from its users?

The patent laws give the right to exclude others from making, vending or selling a new invention. They permit licensing of an invention on terms which do not conflict with public policy—which is interpreted at present to restrict the return on the article or actual use of the invention to royalty payments. Other types of restrictions, such as territorial limits and the selling price of the patented material, may still be controlled by license. Narrow interpretation by the Supreme Court has brought the number of patent applications to the lowest point in recent years. This has occurred in spite of the tremendous increase in research expenditures since 1930.

### IGNORANCE FEARS PATENTS

In general, plant process improvements seem to be largely determined by the local management. The more local the management and smaller the plant, the less well-informed is the manager with respect to patent laws and cost systems; for he seldom has to consider broad company policy nor does he tend to meet persons interested in these fields.

The result is that the manager is afraid of patents. They represent law —and worse, an unknown law. His habitual reaction is that the less one has to do with law the better. (Actually, the better one understands the law the more he can use it as a tool. This is recognized as a reason why lawyers often do well in business.)

He has been known to balk at signing even a free license because of fear of involving himself in an infringement suit. He does not recognize that the mere fact that a patent has been issued is more protection against a charge of infringement than the lack of one; and practicing the invention without a license, or even with an implied license through sale of the materials used, is no great protection.

In cases of licenses based on patent applications the protection is less secure, of course, but it is at least probable that a patent lawyer has made some search of the prior art. If the inventor (or his representative) deserves confidence, he will not knowingly involve himself or others in infringement proceedings.

Where the process user desires protection against infringement proceedings, he must recognize that the insurance cost to the inventor must be borne by royalties paid. These are often used to build up a fund to a predetermined size or to buy insurance at a rate determined by agreement between an insurance firm and patent lawyers. It is also readily possible for the manufacturer to insure himself directly through insurance companies.

### FREE LICENSES WORTHWHILE

Even where the license is free of royalty it has some value to both the inventor and licensee: A free license will stipulate an acknowledgment of validity. It will clarify the place of use and the need to mark the goods produced. Marking with a patent number usually tends to give prestige to the product. It identifies the quality of the product. It protects the rights of the patentee. The free license may include an agreement to give needed service. It may protect improvements which the licensee may make on the patented process. An agreement on the time period covered may also have value.

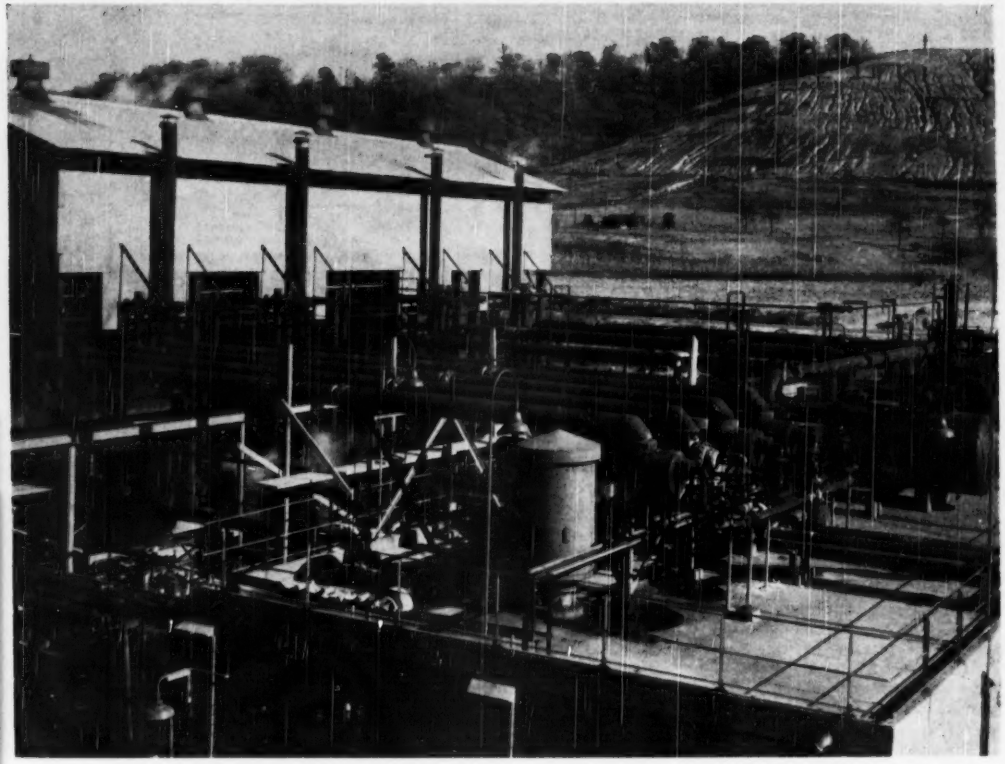
Today a large number of patents are procured with no expectation of measurable return. They are expected to protect freedom of action in a given field of use against some patent lawwise shyster who might try to grab some easy money by threatening an infringement suit.

Such patents may provide some additional intangible returns. If properly presented and timed a free license offer by a salesman can be made to build good will and to emphasize company initiative and generosity.

Some patents now so used to protect a field of interest would probably fit into the borderline group which could be made to pay a monetary return on their initial investment if actual savings could be proved.

It used to be possible to control the sale of an unpatented article used in a patented process but the Supreme Court now holds this as an illegal extension of the privilege granted by the Constitution and statute. It is difficult if not impossible today to maintain a suit for contributory infringement since this also will be held to be an attempt to control the sale of an unpatented article. For such use-patents you cannot base your sales on signing a license. You cannot discriminate among equivalent purchasers. About all you can do legally is charge a fee directly for the use of the patented process.

Consumers need to understand the work and expense involved in developing processes for their use. They need to be informed of the true nature of patents and patent licenses. There is a social value inherent in their helping to repay their just share of this voluntary expenditure by the patentee in order to encourage him to develop other improvements.



**The 85% magnesia insulation on the equipment of the phthalic anhydride production unit of Koppers-Pittsburgh Co. at Kobuta, Pa. is made weather-resistant by application of an asphaltic mastic, the piping by covering with an asphalt-saturated asbestos roofing felt.**

# How Koppers-Pittsburgh Solved Outdoor INSULATION Problems

by MARSHALL F. ALLEN, Manager
Magnesium Insulation Manufacturers Assoc., Washington, D. C.

**OUTDOOR PLANT CONSTRUCTION usually poses special equipment and pipeline insulation problems. Here is how these were solved at the phthalic anhydride plant of Koppers-Pittsburgh Co., Inc. at Kobuta, Pa.**

EVEN in northern sections of the country, where bad weather is common, the trend is toward open construction in chemical plants. In open plants, insulation of heated equipment is usually more important and more difficult than in the conventional housed plant. A case in point is the new phthalic anhydride unit at Kobuta, Pa., owned by the Koppers-Pittsburgh Co., a joint subsidiary of the Koppers Co., Inc., and Pittsburgh Plate Glass Co.

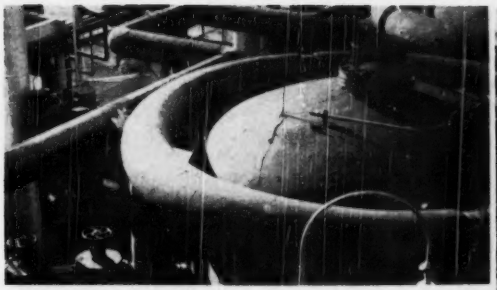
## THE PLANT

The plant has a design capacity of 700,000-800,000 pounds per month. It has four identical lines where preheated air and naphthalene are fed to catalyst-filled converters for oxidation to phthalic anhydride. Converter temperature ranges from 250°F to 750-800°F. The crude product from the converters is condensed as a solid. It is then melted and fed to a distillation column for final purification.

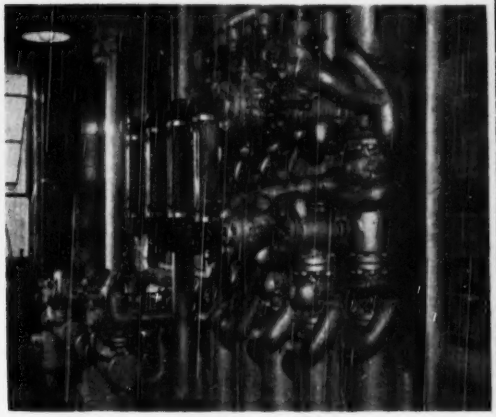
Most of the process steam is supplied by a mile-long 6-in. line from the boiler house in an adjacent plant. Additional steam is supplied by heat exchangers, which recover heat from the converters. The heat exchangers generate steam at 150 psig and 15 psig.

Temperature control is a critical factor, since the process stream freezes at about 170°F and ambient air temperatures may fall to −15°F in this part of the country. Weather conditions include winds, storms, rain, snow, sleet, etc. The insulation must keep heat losses at an allowable level without excessive maintenance and repair work.

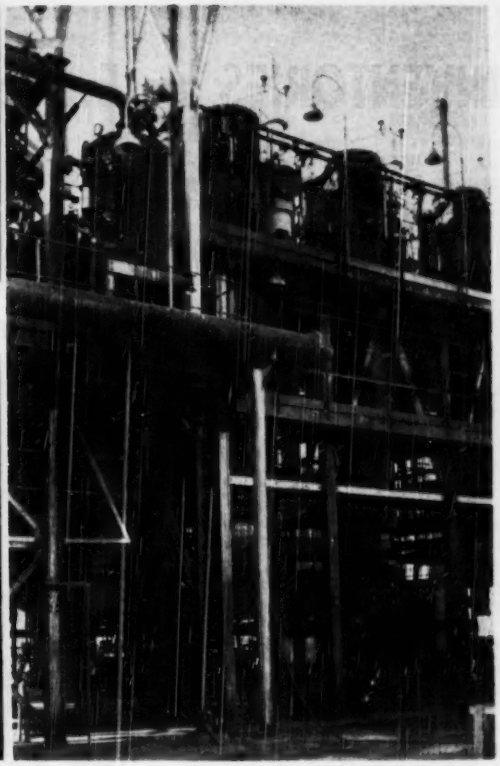
Except for the converters and heater, the operating temperatures of which exceed 600°F, all lines and equipment are insulated with 85% magnesia. For operations above 600°F, a combination of an inner layer of diatomaceous silica and an outer layer of 85% magnesia is used. This combines the advantage of resistance to



Diatomaceous earth-85% magnesia combination insulates bustle rings and converters. Emulsified asphaltic mastic resists weather.



The instrument lines are steam-traced and insulated with fitted 85% magnesia which is finished with an aluminum-painted canvas cover.



The condensers (vaporizers and converters at left) are all insulated with 85% magnesia and made weather-resistant with asphaltic mastic.

high temperatures of the former material and the low heat conductivity of the latter.

The converters and heater were insulated with 1½ in. of diatomaceous silica and 2½ in. of 85% magnesia. All other apparatus was insulated with 1½, 2, and 2½-in. thick 85% magnesia blocks, the particular thickness used depending upon the equipment and operating temperature.

To be satisfactory, insulation on outdoor equipment must meet the following conditions: there should be no cracks or openings through which air can infiltrate to the hot metal surface; the insulation must be anchored firmly to the equipment surface and have a weather-resistant finish.

### APPLICATION OF INSULATION

At this plant, surfaces to be insulated were kept at full heat while insulation was applied. This avoids cracking the insulation by expansion of cold equipment when it is raised to operating temperature.

Where possible, joints in both single and double layer insulation were staggered and all joints were sealed with asbestos cement.

Pipe insulation was fixed in place with 16-gauge annealed iron wire loops spaced 9 in. apart. A weather-resistant jacket of 45-pound asphalt saturated, but uncoated, asbestos roofing felt was applied and secured with 16-gauge copper wire. All joints in the jacket were lapped at least 2 in., with the longitudinal laps facing down to shed water. For steam-traced process lines, pipe insulation one size larger than that used for the process line was applied so as to insulate the two pipes as a unit.

All fittings and valves at Kobuta were insulated to prevent the large loss of heat that would result if they were left exposed to the weather. Furthermore, in the case of phthalic anhydride, it is absolutely necessary to prevent frozen lines.

Fittings and valves 3½ in. and smaller were insulated with asbestos cement, applied in ½-in. thick layers, to the same total thickness as the adjacent pipe insulation. Larger fittings and valves, as well as steam separators, were insulated with blocks cut to fit, with all cracks and voids filled with asbestos cement. The weatherproofing was the same as that for pipe insulation: asphalt-saturated asbestos roofing felt.

Block insulation was secured to the surface of apparatus and tanks by means of 14-gauge B.W.G. annealed iron wire. On large vertical towers, $\frac{3}{16}$-in. galvanized steel cables were used instead. On the converters, special cable anchorage in the form of vertical angle irons was tack-welded at 10-ft. intervals. On the heads of horizontal equipment, the insulation blocks were held in place by tie wires anchored to a cable looped behind the rivet heads on the shell.

A ¼-in. layer of asbestos cement was applied over the blocks. To protect the insulation against the weather, a layer of emulsified asphalt mastic was troweled on over 2-in. galvanized iron wire netting stretched over the asbestos cement.

Instrument lines in the control room presented a particularly difficult job. The lines and valves are steam-traced, of complex shape and very close together. They were insulated with standard pipe insulation mitered to fit the curved surface and asbestos cement to fill all voids. Insulation was finished with a pasted canvas jacket.

# INVENTORIES are Everybody's Job

by V. R. BECHTEL, Budget Director
American Cyanamid Co., New York, N. Y.

**Watching inventories is a job for everyone but it's often neglected for more specific responsibilities. Holding down inventory losses is a complex problem calling for coordinated supervision.**

IN THE chemical business inventories are usually the largest* and most dubious item among the current assets of the balance sheet.

A current asset is supposed to represent something that is the immediate or near-term equivalent to cash—something that can be used 100 cents on the dollar to meet payrolls, tax payments and other bills even in the roughest of business recessions.

When stagnant business periods come upon us, accounts receivable become slow but generally can be largely converted to cash in a 30- to 90-day period. Inventories, however, are stubborn and in many instances doubtful assets. Even during good times persistent efforts are required to keep them clean, so that in all cases values can be fully realized in cash; but in bad times replacement values are lower, obsolescence and deterioration become important factors, and the number of months' supply multiplies as demand is divided. There is nothing so discouraging to a highly-trained sales staff as having to concentrate on liquidation of excess or off-quality inventories. They are trained to sell quality and active goods and are caught off balance when liquidation at cut prices becomes part of the job.

It is relatively simple to control accounts receivable in a large organization inasmuch as a limited number of experts are charged with acceptance of credits and in collecting bills after credit is granted.

### COLLECTIVE RESPONSIBILITY

But inventories are the responsibility of several thousand persons in a large business. Purchasing agents, engineers, department heads, sales executives and salesmen, production executives and plant managers, scheduling clerks, production supervisors and foremen, warehouse clerks, stock clerks and even each plant production worker—in addition to top management—have some inventory responsibility. Each has other specific responsibilities, in most cases greater to them than the question of whether an inventory is kept low, clean, and active.

"It is human nature for sales people to want heavy stocks in order to insure immediate shipment of every customer's order."

It is only through recognition of the complexity of the inventory problem and the necessity of a coordinated supervision that industry keeps its colossal annual losses from becoming even larger. Each dollar lost on inventories is, except for federal taxes, a full dollar lost.

Inventories are maintained to serve customers promptly with fresh, high-quality goods at prices which are competitive and yet yield a net profit sufficient to justify stockholders' putting up the funds to operate and expand the business.

It is human nature for sales people to want heavy stocks in order to insure immediate shipment of every customer's order—normal and abnormal in size. It is human nature for production people to want to run plants at high and steady rates to secure low costs and to provide steady work to employees. It is human nature for purchasing, warehouse and scheduling personnel to protect themselves by having plenty of goods right down the line.

It is, therefore, absolutely necessary for management to provide some correllating organization to keep inventories as low as is consistent with good service to avoid heavy losses as well as to fit into an overall financial program.

In our case, a desirable inventory position on individual finished products ranges from a few days to as high as 1, 2, or even 3 years. Over-

* American Cyanamid's inventories at the end of
1948 totaled $49,000,000
accounts receivable were 21,500,000
and cash was 32,000,000

all average of all stocks is about 3 to 3¼ months.

### CONTROL FROM THE TOP

Inventory control has always had an important part in the policies of Cyanamid management. This became increasingly necessary during the war and after the war as larger sums were tied up, materials were first scarce and then plentiful, and prices of raw materials fluctuated widely.

To cope with the increasing complexity of the problem, at each inventory location committees were set up composed of production, purchasing, engineering sales and accounting personnel. A central committee was also established.

Detailed analysis of each inventory —showing turnover, excess, slow-moving and off-quality items with appropriate summaries—are made available for study and follow-up. Reports on returned goods, goods written off and salvaged are also available.

Management policy, as a part of the education and training program to effect improvement in inventory position, is passed down through the inventory committees and local management. This is in addition to and in cooperation with divisional executive management which carries the divisional responsibility.

One of the major responsibilities of the inventory committees is to spade up every inventory item which needs attention and to promote close and friendly coordination between sales, production, purchasing and other departments on inventory problems.

Careful estimates of future requirements of each raw material used are prepared for a year ahead and brought up to date each quarter to assist the purchasing department in placing contracts and keeping suppliers accurately informed on changes in current and future needs.

Lead time required to secure delivery of each material purchased is under constant study and revision to the end of maintaining adequate, but avoiding excessive, stocks.

Strange and unbelievable practices are uncovered in purchasing, scheduling and stocking goods. A simple example is stocks of coal used as fuel: What good is there in carrying a 6 months' stock of coal if all industry, especially transportation, is shut down within 60 days after John Lewis calls a coal strike? The only result is wasted investment, storage costs, and some deterioration.

**"It is, therefore, absolutely necessary for management . . . to keep inventories as low as is consistent with good service."**

### FIRM HAND NEEDED

Each sales manager and salesman is conscious, in some degree, of the profit results of his efforts. Their interest and help to keep inventories in line can be secured if you make clear the cost of carrying inventories is a large percentage of their cost of sales and cuts into their gross margins. In the pharmaceutical end, for example, the cost of carrying inventory is at least 10% to 15% of the production cost of goods sold. Point out also that losses through obsolescence, deterioration, and returned goods is always larger where excessive stocks are carried—another direct cut in profit margins.

Another source of continuing loss is your inventory "attic." Products are deleted without prior coordination with your inventory control and scheduling. Package size, shape, or color is changed and thousands of bottles, boxes, labels, etc., are obsoleted. These hang on in your "attic" forever unless strong control is effected to use them up or in some way dispose of them.

A great deal of the inventory "attic" is created by lack of coordination from sales through purchasing and production. Sales estimates are optimistic; and as the cost per unit is not large, a good safety percentage is added. Scheduling adds another safety factor and the buyer lays on another. Result: Up to 50% or more excess production than a realistic sales estimate warrants.

Very possibly in your own plant thousands of some items are on hand—obsoleted because some new gimmick was adopted without real effort to use up existing stocks before making the change. Someone likely assumed that the purchasing department could return for credit or re-sell at cost, but experience shows losses run from 25% to 90% on this type of orphan.

When one consistently follows a fixed policy of getting to the market "firstest with the mostest," inventory losses are higher than if a saner, more sensible approach were followed In addition, a lot of major product or merchandising mistakes would be avoided.

To control your inventory you must know what you have, where it is, and how it is packed. Records must be accurate and up-to-date at all times and must be used by persons qualified to translate the totals into sales needs, production schedules, and purchase requisitions. Give your scheduling people the facts in full detail. See to it that sales projections are realistic: Don't allow an anvil chorus of blame to be heaped on scheduling and production if they generally do a good job but once in a while fail to come up with material to fill a two-buck sales order within 20 minutes after it arrives. Good salesmen do not, but weak ones do, need an alibi once in a while for missing quotas.

Some standard products and materials can be controlled through use of maximums and minimums, but constant revisions are necessary to keep up with sales conditions. Stocks should not be built generally to maximums, and the order point may be above or below the minimum at times. Replacement of sales is a less tedious

way to schedule, but it can get off the track unless exceptional circumstances are constantly recognized.

### SPECIALTY PRODUCTS UNIQUE

The pharmaceutical and specialties inventory problem is unique in that these products are generally sold by manufacturers to distributors, hospitals and drugstores—only one or two steps from the actual consumer. Most basic chemical products are sold to processors who may be several steps from the ultimate consumer. Also, many pharmaceutical products require long time cycles to process and package. Many require curing time up to six months or more. Raw materials may come from long distances or are available only on a seasonal basis.

The average inventory required from raw materials out through branch stock is necessarily larger in terms of number of months supply. A 6 months' average inventory is an unusual performance and some run up to 10 or 12 months. Our average—exclusive of bulk drugs such as sulfas—is in the 7 to 8 months' range.

Pharmaceutical and specialty products must carry a wide margin of gross profit. It is, therefore, more usual than not to find an attitude of management favoring over-generous stocks. To some degree this attitude is warranted. The health, even life of customers may be dependent on one or a few producers of a special drug or medical product. On others, competition is such that if your product is not available on request a substitute is purchased.

Liberality on inventory is often carried to the extreme and becomes a costly burden on the business—and it eventually becomes an unnecessary burden on the consumer. No business enterprise can afford an indifferent attitude toward the size of its inventories.

In starting out with a new product the best producible data as to probable market is prepared. Materials are purchased, production schedules established, and packaging supplies provided on a basis to serve the indicated market. Should the product not move as expected or in the form and package size or style visualized, huge losses result. In many cases protection can be provided by introducing a new product in a restricted area, then expanding production and distribution into other areas as initial experience dictates.

The nature of some new products and their competitive position may necessitate national introduction at one time. The risk is great and can be minimized only by setting up a fast-moving program from raw material to the packaged goods. Careful and conservative planning and scheduling saves many huge losses which result from over-optimism and careless preparation.

### SHOULDERED OUT

Old products, even widely used ones, are often partially or wholly replaced with a new one in a short period.

One of our best examples is pneumonia serum, in its 32 types, which was replaced almost overnight by sulfa drugs: Cynamid had several millions of dollars invested in research, in a colony of 30,000 giant rabbits (each separtely housed), in large production and refining facilities, and in large inventories—all of which became worthless.

Fortunately for our volume and profits, we were the chief instigators in putting this valuable line of products out of business, securing, along with other companies, substantial profits from sulfas.

A slower replacement of sulfaguanidine in the veterinary field by sulfamethazine and inroads into penicillin business by Aureomycin, Chloromycetin and streptomycin are other examples. In the case of penicillin the present price position has indeed marked it as "a drug on the market."

It is not usual that a well-established product is wiped out so quickly as was pneumonia serum. Considerable time is available to bring production and stocks into line with the narrowed market, provided management is able to properly and promptly appraise the new competitive products.

Also, losses in volume and profits can be made up if management has had the vision to foresee what is coming and is up with or ahead of competition with the replacing products. Normally profit margins are wider on new products than on old ones; hence profits may even be improved to offset plant, inventory and other losses on the old products.

Research progress is becoming more rapid each year. Your pet and best profit-maker may be a ghost product tomorrow. To lose your sales volume is a serious set back. The additional loss on inventory can be a serious blow to your overall profit position. Keeping stocks on as low a level as possible—right through the commitment for materials, and prompt action when danger signals arise will help cut losses.

Customers' stocks keep coming back for various reasons, especially when business is slow and cash scarce. Unless you have a firm policy and work that policy all the way through to your field salesmen, there is no limit to your inventory responsibility until the product is consumed. High-pressure selling and overstocking customers is partly the cause of these belated returns.

Returned goods cannot be eliminated, but firm policy on customer returns and prompt destruction and salvage (to the extent possible) will keep stocks clean, hold losses at a minimum avoid cluttering up a lot of warehouse space, and cut rehandling costs.

### FORECASTING NEEDED

Sales forecasts should be prepared not only in dollars but in size and style of packages. Monthly, or at least seasonal breakdown, is also essential. Sales forecasts should be prepared by the sales staff, with factual data on prior performance before them. An independent and unbiased check should be made of all sales estimates by a staff removed from the necessary enthusiasm of sales personnel and well grounded on general business conditions.

Our experience has repeatedly shown that large inventories do not protect against delays in filling sales orders. Demand shifts and orders are heaviest for items other than those in heavy supply. Ample plant capacity and an alert production department is a better answer than excessive stocks.

We have also found that extra care needs be given to stocks when a plant is cut back or shut down. Figure out carefully how long it will take to get the plant back to heavy production and set your stocks accordingly.

The many departments and people concerned with inventories all cooperate fully when you have the facts and can make your case clear. When you put your finger on inventories of goods running up to 6 months or more, and when cash in the till is down to a 6 weeks' inventory or less, you get a uniform answer: Let's reduce the inventory! You can also point out that every dollar unnecessarily tied up in inventory means a dollar less available for new plants or to handle new business.

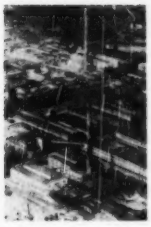
There is only one way to prove the adequacy of any policy: How does it meet rigid tests? In August we experienced our largest month's sales in the Company's history—30% over July. September beat August and October beat September. That unexpectedly large and continued volume was handled with relatively few difficulties.

It is now obvious that we had less trouble than if our stocks had been larger but less clean and less well-balanced.

Adapted from a paper given at the meeting of the American Pharmaceutical Manufacturers' Association, November 30, 1949.

A **CI** REPORT ON

# GERMANY'S CHEMICAL RECOVERY



by JAMES V. BRENNAN*

**IN 1949, CHEMICAL PRODUCTION in U.S. and British Zones reached 90 per cent of 1936 level. French Zone also approached 1936. Soviets rebuilding destroyed plants in Eastern Zone. Here is latest information.**

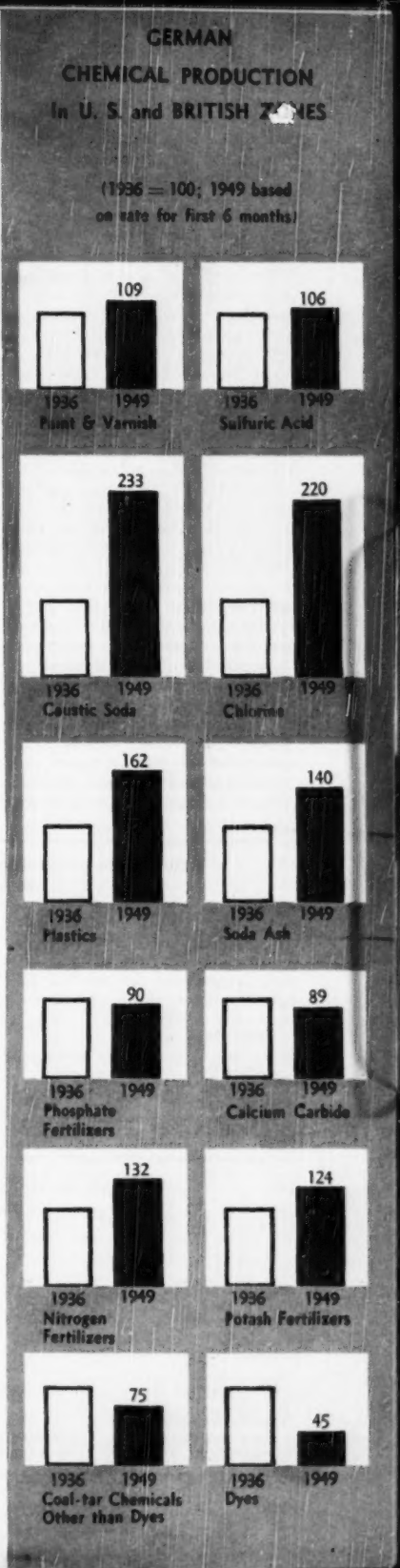
THE chemical industry of Western Germany has made considerable progress along the road to recovery. By October, 1949, production of chemicals in the area had reached 90 per cent[1] of the 1936[2] level. Economic union of the three western zones had been effected, and many materials and products were being freely exchanged within the integrated territory. Considering the many obstacles and adversities which have hampered the industrial rehabilitation of Germany, this is little short of remarkable.

At the war's end in 1945, production in those chemical plants which were in operable condition was slowed down or stopped for many months. Operations were resumed only gradually. Enforced shutdowns were necessary from time to time because of dire shortages of coal, coke, and electric power.

Industrial production was greatly assisted by the integration, on July 30, 1946, of the United States and British Zones, in that the movement of raw materials and products was facilitated. By the end of 1946 the chemical industry was reported to be operating at about 40 per cent of the 1936 average. Further progress was very slow until the currency reform of June 30, 1948, provided an almost immediate beneficial effect. The stabilized mark offered an incentive to manufacturers to increase production (and incidentally to report the true state of their operations), so that by the end of 1948 production had reached 76 per cent of the 1936 output.

## WAR CHANGES

The primary concern of Germany's war planners had been for the development of chemical substitutes for critical industrial materials which might not be available in time of war. High on the list were textile fibers, rubber, petroleum, and fats. This led to research into and later development of substitutes for many essential commodities. Throughout World War




* Mr. Brennan is a Foreign Service Officer detailed to the Chemical Branch, Department of Commerce, Washington, D. C. In preparing this report he had access to the latest Government information on German chemical production.

[1] It should be noted that statistics on postwar German production through mid-1948 must be viewed with some reservation for a variety of reasons. Wartime disruption of the central government and apprehension over growing inflation, with a consequent resorting to black market and barter transactions, were the principal reasons why manufacturers reported only production sufficient for obtaining allocations of coal, power, and raw materials. They withheld certain unreported portions which were to be used as bartering exchange and to pay their workers.

[2] The year 1936 has been selected as an approximately "normal" year, since war production had not yet begun to any great extent and the country had recovered by that time from the depression.

II, the German chemical plant as a whole was being enlarged, and, despite the considerable damage suffered during the war, capacity was far greater in 1945 than it had been in 1939.

World War II brought about a shift in the geographic location of Germany's chemical industry. Most of the prewar output came from a few areas where conditions of supply and transportation were especially favorable, although all parts of the country produced some chemicals. The major producing centers were: *The Ruhr-Cologne region* (Westfalen and Rheinprovinz), where much of the industry was based on coal derivatives, although there was also a sizable output of almost every type of chemical; the *Frankfurt-Ludwigshafen region*, which contained the I. G. Farben headquarters and some of the principal dye and pilot plants of that concern; the *Merseburg region*, where the I. G. centers of Wolfen, Bitterfeld, and Leuna, as well as others, were based on cheap power generated from brown coal; and the *Berlin region*, which had a varied output, but was particularly important in the production of pharmaceuticals, perfumes, paints, varnishes, and other consumer goods.

The German chemical industry of today is more widely distributed than ever before. In the last phases of the war preparation program, the chief concern was the placement of new factories at points where they could most readily utilize home resources if the normal sources of supply were to be cut off. Therefore, some of the plants whose capacity was designed to make Germany self-sufficient were placed in or near the forested regions of the south. As the war progressed and Germany became subjected to air attacks, there was a shift in construction from areas where peacetime developments would normally have taken place.

### I.G. FARBENINDUSTRIE

In 1943, there were 4,000-odd chemical plants in Greater Germany. The I. G. cartel owned directly, or participated in the ownership or operation, of about 380 plants. However, the importance of this firm to the chemical industry may be adjudged by the fact that it accounted for approximately 50 to 55 per cent of all chemicals and allied products made in Germany.

Not only did I. G. have a monopoly, or near monopoly, of a great number of finished products, but other chemical companies and numerous strategic industries were either totally or largely dependent upon it for many raw materials, intermediate products, and technical assistance.

In addition to its holdings in Germany, the I. G. world combine included over 500 organizations both acknowledged and "camouflaged," in practically every major country of the world, including the United States. Cartel agreements throughout the world numbered over 2,000.

The exports of this fabulous combine represented approximately 50 per cent of Germany's total prewar chemical exports, thus making important contributions to Germany's foreign exchange. Its trade was strongest in pharmaceuticals, dyes and coal-tar intermediates, photographic materials, and nitrogenous products, including both fertilizers and explosives.

Of the plants in the four Zones of occupation either owned outright or 100 per cent subsidized by I. G., 9.75 per cent were located in what was the United States Zone; 11.5 per cent in the British Zone; 20.2 per cent in the French Zone; and 58.55 per cent in the Russian Zone. Some of the important wartime additions to the I. G. empire were in German and Polish Silesia, the former now being administered by the Polish Government.

One of the first acts of the Allied Control Council was to take direct control of the I. G. and begin a decartelization process.

### PRODUCTION IN THE AMERICAN-BRITISH ZONE (BIZONE)

Production of chemicals remains one of the important industries of Western Germany. The full status of this industry cannot be gathered from its size alone, but rather by the extent to which many other key industries, both in Germany and other European countries, are dependent on it as a source of supply for raw materials and intermediate products. Included in this category are the textile, tanning, food, paper, rubber, glass, and petroleum industries.

Although the three Western Zones are now a single economic entity, the lack of comparable statistics for the French Zone before mid-1949—particularly on foreign trade—make it advisable to treat the Bizone and the French Zone separately for statistical purposes.

About 53 per cent of the chemical production of all Germany in 1936 came from the Bizone. The following table shows production of the principal industrial chemicals manufactured in the Bizone in 1936, and postwar. All tons referred to in this report are metric tons.

Current rate of production of most of the heavy chemicals in Bizonal Germany is in excess of that of 1936. Specific commodity data on some of the principal items are as follows: .

*Sulfuric Acid:* Pyrites are the chief source of sulfur for producing sulfuric acid in Germany. Prewar, Germany was the leading importer of pyrites, drawing its supplies largely from

**I—BIZONE PRODUCTION OF PRINCIPAL INDUSTRIAL CHEMICALS**
**('000 Metric Tons)**

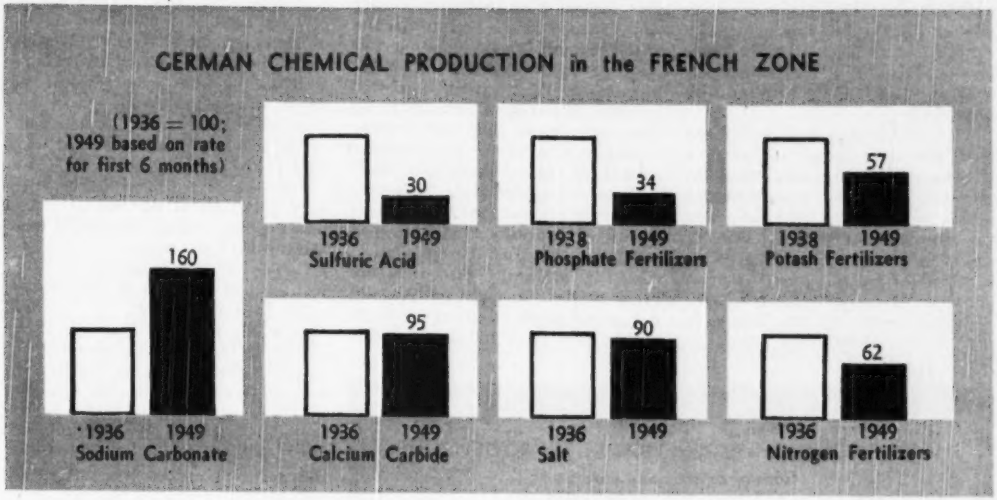
| Period | Sulfuric Acid | Caustic Soda | Chlorine | Soda Ash | Calcium Carbide |
|---|---|---|---|---|---|
| Year — 1936 | 821.0 | 94.8 | 61.2 | 375.0 | 477.6 |
| Monthly Avg. | 68.4 | 7.9 | 5.1 | 31.2 | 39.8 |
| Year — 1946 | 279.2 | 82.1 | 61.0 | 205.8 | 234.7 |
| Monthly Avg. | 23.3 | 6.8 | 5.1 | 17.1 | 19.6 |
| Year — 1947 | 421.8 | 89.6 | 65.0 | 253.8 | 215.5 |
| Monthly Avg. | 35.2 | 7.5 | 5.4 | 21.1 | 18.0 |
| Year — 1948 | 620.5 | 155.4 | 100.5 | 377.2 | 333.6 |
| Monthly Avg. | 51.7 | 12.9 | 8.4 | 31.4 | 27.8 |
| Jan.-June 1949 | 435.3 | 110.6 | 68.3 | 261.7 | 212.3 |
| Monthly Avg. | 72.5 | 18.4 | 11.4 | 43.6 | 35.4 |

Source: Bipartite Commerce and Industry Group, Monthly Statistical Bulletin of the Central Commission for Germany (Br. Element), Vol. IV, No. 2, Feb. 1949 and June 1949.

**II—BIZONE PRODUCTION OF FERTILIZERS**
**('000 Metric Tons)**

| Period | Potash ($K_2O$) | Nitrogen (N) | Phosphate ($P_2O_5$) |
|---|---|---|---|
| Year — 1936 | 527.8 | 212.9 | 336.0 |
| Monthly Average | 44.0 | 17.7 | 28.0 |
| Year — 1946 | 283.9 | 106.5 | 81.1 |
| Monthly Average | 23.7 | 8.9 | 7.2 |
| Year — 1947 | 322.0 | 134.7 | 102.1 |
| Monthly Average | 26.8 | 11.2 | 8.5 |
| Year — 1948 | 509.7 | 201.0 | 200.7 |
| Monthly Average | 42.5 | 16.8 | 16.7 |
| Jan.-June 1949 | 328.0 | 139.5 | 150.5 |
| Monthly Average | 54.7 | 23.3 | 25.1 |

Source: Bipartite Commerce and Industry Group Monthly Statistical Bulletin of the Central Commission for Germany (Br. Element), Vol. IV, No. 2, Feb. 1949 and June 1949.




Spain, Malta, and, to a lesser extent, from Norway. During the war large unexploited deposits were discovered in the southeastern part of Westphalia, and peak wartime output exceeded total prewar imports. The mines were worked largely by Eastern labor, and in the postwar period it has been difficult to attract German labor to this work. Production is currently on the upswing, however.

Output of sulfuric acid in June 1949, of 72,500 tons ($SO_3$ basis) was 6 per cent above the monthly average for 1936. It is anticipated that production in 1949 will amount to 800,000-850,000 tons. Current supplies are inadequate for demand.

*Caustic Soda:* Production for the past year has been considerably in excess of prewar. In June, 1949, 18,400 tons were turned out, representing an increase of 135 per cent over the monthly average for 1936.

*Chlorine:* Output from 1946 to date has been consistently equal to or higher than that of 1936. In June, 1949, production of 11,400 tons was at a rate of 131 per cent of the monthly average prevailing in 1936. Difficulty is now being experienced in disposing of the surplus chlorine.

*Soda Ash:* Production in 1948 topped the 1936 level slightly, and in June, 1949, output of 35,800 tons ($Na_2O$ basis) was 15 per cent greater than the 1936 monthly average. In March, 1949, production was 61 per cent in excess of the 1936 monthly average, but had to be decreased because of lessened demand for this item in the main consuming industries of glass and soap powder.

*Calcium Carbide:* Output in June, 1949, of 45,000 tons was 13 per cent above the 1936 monthly average.

*Fertilizers:* Before the last war, the highly industrialized Bizonal Area produced approximately 40 per cent of the country's total agricultural output, or 60 per cent of the Area's own requirements. In the period from 1939 to January, 1947, the Bizone's population had increased 16 per cent. Consequently, in order to obtain the greatest possible crop production in the summer of 1946, special emphasis was placed on the production of much-needed fertilizer materials when the chemical industry resumed operations.

Under the impetus of this program, production of fertilizer components in 1946 was 44 per cent of 1936, increasing to 52 per cent in the following year, and in 1948 the output reached 85 per cent of the 1936 figure. Production during June, 1949, was 25 per cent above the monthly average for the year 1936.

Although Germany has been historically a net exporter of nitrogenous fertilizers, wartime damage to plants, together with the general disruption of the country's economy, caused an appreciable decrease in production from prewar levels. However, neglect of the soil, plus the current necessity of increased crop production, has indicated the need for higher application of fertilizers. Thus, the Bizone's current fertilizer requirements have been placed considerably in excess of prewar. It is doubtful, however, whether the farmers can be persuaded to buy as much as the authorities consider desirable for maximum production.

The Bizone's annual (1950-51) requirements of fertilizer materials have been estimated by ECA at 400,000 tons of nitrogen (N), 480,000 tons of phosphates ($P_2O_5$), and 700,000 tons of potash ($K_2O$). Of these, potash alone is expected to be produced in quantities sufficient for the demand. Production of fertilizers in 1936 and postwar is listed in Table II.

Targets of fertilizer production for 1949-50 and 1952-53, as listed by ECA, are as follows (in thousands of metric tons):

| *Fertilizer* | *1949–50* | *1952–53* |
|---|---|---|
| Nitrogen (N) | 290 | 380 |
| Phosphate rock | ... | ... |
| Phosphates ($P_2O_5$) | 280 | 437 |
| Potash ($K_2O$) | 650 | 800 |

*Potash*: Prior to the war, Germany's production and exports of potash salts were maintained at a high level. In 1937, production of crude salts was 14,460,000 metric tons, equivalent to 1,968,400 tons $K_2O$. Exports in the same year totaled 781,287 tons of crude salts and 741,522 tons of processed potash. Inasmuch as the larger potash mines are located in the Soviet Zone (60 percent of prewar output), production by the Bizone has, of necessity, been on a somewhat limited scale. Output by seven mines in the British Zone


## REPRINTS

Reprints of this report are available at 50 cents per copy. Special prices will be quoted on quantities of five or more mailed to one address. Send requests to Editorial Department, Chemical Industries, 522 Fifth Ave., New York 18, N. Y. Remittance must accompany order. Stamps acceptable.

in 1948 totaled 2,410,000 tons of potash salts or 260,000 $K_2O$, compared with 199,000 tons of $K_2O$ in 1947. Totals for the Bizone were 510,000 and 322,000 tons of $K_2O$ during 1948 and 1947 respectively.

A search for deposits of potash and rock salts was begun in northern Germany, near Bremen, before the war. Potash deposits were discovered in this region several years before the war but were not exploited. It is likely that development will be intensified now that competition from mines of the Soviet Zone has been removed.

Export targets for the Bizone in 1949-50 are 60,000 tons valued at $6 million, and for 1952-53, approximately 80,000 tons valued at $8 million.

**GERMAN CHEMICAL PRODUCTION IN THE SOVIET ZONE**

Estimated current annual production:

| | |
|---|---|
| Sulfuric Acid | 120,000-150,000 tons |
| Caustic Soda | 80,000-85,000 tons |
| Synthetic Nitrogen (Luena only, 11 mos. 1948) | 160,000 tons |
| Calcium Carbide | 200,000 tons capacity (Reported production much less) |
| Phosphorus | 1,000 tons capacity |
| Carbon Bisulfide | 12,000 tons capacity |

*Dyes*: The once-great dye industry felt the effects of the war-caused economic dislocation to a greater degree than did any other component of the German chemical industry. In 1936, production was in the neighborhood of 37,000 tons; in 1947, when manufacture was resumed, output had decreased to around 4,000 tons, or only 11 per cent of that in 1936. Considerable progress was made during 1948, however, and production for that year totaled 11,700 tons, or slightly more than 31 per cent of 1936. Further gains have been made during 1949, owing primarily to the availability of more nearly adequate coal supplies, so that during June of that year the production of 1,400 tons was at the rate of 45 per cent of the 1936 monthly average.

Production of coal-tar chemicals other than dyes had risen to 75 per cent of the 1936 production by the end of 1948. Postwar production of coal-tar products by years is given in Table III.

In June 1949, coal-tar oils were being produced at a rate of 19 percent in excess of prewar, but all other coal-tar items were below 1936 levels. Although German dyes (as well as those from other countries) were in high demand in the immediate postwar period, it is doubtful whether German exporters will regain their former position of prominence in world markets. In 1936, exports accounted for about 38 percent of Germany's total sales of coal-tar dyes and organic chemicals. Also, in that year, German exports of coal-tar dyes and intermediates represented about 54 percent of the total world exports of these commodities. However, it must be remembered that the I. G. Farbenindustrie controlled practically the entire organic chemical industry of Germany then, and through its efficient, well-organized sales force and its worldwide cartel arrangements, it was able to control a major share of the world market for these products.

The story today is quite different. The I. G. cartel is under control of the Occupation authorities; also, many of the European countries which formerly imported considerable quantities of organic chemicals from Germany now have large manufacturing plants of their own. Among these are Switzerland, which is now a net exporter of dyes, Belgium, the Netherlands, France, Italy, and the United Kingdom, all of whose domestic chemical production has expanded considerably over prewar.

*Alcohol*: The production, allocation, and sales (including imports) of all alcohol in Germany are still regulated by a prewar law, which set up a group of officials appointed by the Laender Finance ministers. The activities of this group are currently being investigated by the Decartelization Board.

In the year ended September 30, 1938, 4,158,100 hectoliters were produced, and in the two preceding years, 3,633,600 and 3,686,300 hectoliters, respectively, were manufactured. Recent statistics are incomplete and are available only for the period April through July 1949. In that period 4,279 tons were produced for a monthly average of 856 tons.

*Hydrochloric Acid*: Production is still far short of demand, but manufacturers face the problem of disposing of the byproduct, i.e., sodium sulfate. Purchases by the soap powder industry have decreased and export demand is relatively small. Almost half of the sodium sulphate produced was exported in prewar years.

*Formaldehyde*: Production in January 1948, was at the rate of 2,000 tons a month. Prewar production was about 3,300 tons monthly.

*Carbon Black*: Production is expected to be sufficient in 1949-50 to cover domestic demand.

*Soap and Washing Powders*: Production in the first 6 months of 1949 was 27,700 tons of soap and 95,500 tons of washing powder, or approximately 50 percent of the 1936 monthly average. Total production in 1948 consisted of 30,500 tons of soap and 167,200 tons of soap powders, compared with a total of 483,900 tons for both items in 1936. No breakdown is available for 1936 production.

*Paints, Varnishes, and Lacquers*: Prewar production was 133,000 tons in 1936, averaging 11,100 tons per month. This compares with 96,800 tons, averaging 8,000 tons per month, produced in 1948. June 1949 production of 12,100 tons was 9 percent in excess of the monthly average for 1936.

*Lithopone*: Annual prewar production in all of Germany was about 100,000 tons, the greater part of the industry being located in what is now the British Zone. The original capacity is virtually intact, and maximum production could probably be attained without too much difficulty.

*Plastics*: Capacity is much larger than in 1936, when monthly average production was 3,094 tons. In 1938, 68,000 tons of plastics were produced in the whole of Germany; in the first 6 months of 1949, Western Germany produced 30,000 tons. Prewar, German manufacturing processes and fabricating techniques, other than molding, were considered well advanced.

*Insecticides*: Prior to World War II, German insecticide chemists were concerned primarily with the control of agricultural pests and plant diseases, very little attention being given to combatting insects affecting man and animals. The I. G. Farbenindustrie was very active in plant protection work at its research plant at Hochst, near Frankfort, and at its experimental farm at Limbergerhof, near Ludwigshaven.

*Drugs and Toiletries*: Germany's participation in world markets for pharmaceuticals represented 38.2 percent of total world exports in 1936. After World War II, this industry was

one of the first to begin recovery, and straightaway reentered the export market. There were, however, shortages of insulin and penicillin, and imports of both have been necessary to meet minimum requirements. The chemical manufacturing firm of Schering, in the Soviet Zone, reportedly is again producing all its prewar range of patent drugs, as well as penicillin.

Cosmetic production is far larger than prewar.

*Synthesis Plants*: In addition to the above listed chemicals, the Fischer-Tropsch synthesis plants have been active in the postwar period, producing ammonia and methanol (also petroleum products). However, the operation of these plants has now been reduced to the production of hydrocarbon waxes for the manufacture of fatty acids, and by the end of 1949 this manufacture was scheduled to have ceased entirely (by order of the Allied Control Council).

### PRODUCTION IN FRENCH ZONE

By far the largest single producer of chemicals in the French Zone of Germany is the I. G. Farbenindustrie (BASF) complex at Ludwigshafen-Oppau. Production in the Zone (except in the Saar Basin, which, economically, is considered a part of France itself) increased 31 percent in 1948 over 1947, and in the first half of 1949 approached the 1936 output. Present plans call for an increase by 1952 to 142.7 percent of the 1936 level.

Complete statistical information on production in the French Zone is not available, so it is rather difficult to draw a comparison with prewar output. However, from such figures as there are, it is evident that the postwar pattern of the chemical industry differs somewhat from that of prewar. Whereas many commodities are now being produced at a considerably decreased rate, compared with 1936, other items which formerly were not turned out at all are being manufactured. Notable among the new items are methanol, formaldehyde, chlorine, and hydrochloric acid; also, current output of sodium carbonate is some 60 percent in excess of the average monthly rate in 1936.

Table IV indicates average monthly production in 1936 and postwar.

Other chemicals which were produced are as follows:

*Salt*: Postwar production has been at a rate almost equal to the monthly output in 1936. Average monthly production in 1936 was 4,055 tons; it dropped to 2,838 tons in 1947, increased to 3,741 tons in 1948, and to 3,654 tons in the first half of 1949.

*Coal-tar Dyes*: No information is available on prewar production. Output in June 1949 was 300 tons, and the average for the first half of 1949 was slightly less, ranging between 200 and 300 tons per month.

*Paints and Varnishes*: Statistics for prewar production are lacking. Monthly average for the first 6 months of 1949 was 500 tons.

*Washing Powders*: Average monthly production rate in the first half of 1949 was 600 tons, although output in June 1949 was considerably less than that of January. No prewar statistics available.

*Fertilizers*: Consumption of chemical nitrogen as fertilizer in the French Zone was 6.1 percent of the total of all Germany in 1938-39, as compared with 13.8, 28.3, and 51.8 percent in the American, British, and Soviet-Polish Zones, respectively. Production capacity of chemical nitrogen in the Zone was 6.5 times consumption. Current rate of production of nitrogenous fertilizer is still considerably below prewar levels, the 5,951 tons (N content) monthly average in the first half of 1949 being 35 percent less than the average for 1936.

The relative consumption and production capacity of $P_2O_5$ among the zonal areas of Germany in 1938-39 was in much the same order and nearly in the same proportion as that of nitrogen. Surplus production in the French, like that of the British area, was mostly in the form of basic slag, coming from the Saar and Ruhr Valleys respectively. Monthly average production of phosphatic fertilizer ($P_2O_5$) in the French Zone in the first half of 1949 was 1,500 tons. This compares with the monthly average of 4,458 tons of basic slag ($P_2O_5$ content) produced in 1938-39.

Very much the same consumption ratio applies for potash fertilizers in prewar Germany as did for nitrogenous and phosphatic. However, production capacity of potash fertilizer in the French Zone in 1938-39 represented only 4 percent of the total. The deficit was made up by shipments from what are now the American and Soviet-Polish Zones. Capacity in the French Zone (in terms of $K_2O$) in 1938-39 was approximately 67,560 tons, for a monthly average of 5,630 tons. This compares with the 3,200 tons averaged monthly in the first half of 1949.

### PRODUCTION IN SOVIET ZONE

The wartime damage to chemical plants in the Soviet Zone, together with reparation removals are estimated to have reduced plant capacity there to 40 percent of prewar. However, in line with the Soviet policy of strengthening the Eastern Zone, a considerable part of the lost capacity is being rebuilt. Nearly four-fifths of the chemical plants remaining are in the hands of Soviet A.G.'s (corporations) or have been nationalized by German Government agencies.

**III—BIZONE PRODUCTION OF COAL-TAR PRODUCTS**
('000 Metric Tons)

| *Period* | *Dyes* | *Crude Coal-Tar* | *Pitch* | *Oils* | *Phenol, Cresols, Xylenol* | *Crude Benzol* | *Refined Benzol* |
|---|---|---|---|---|---|---|---|
| Year — 1936 | 36.9 | 1,801.2 | 509.2 | 302.7 | 14.4 | 300.0 | 290.5 |
| Monthly Average | 3.1 | 90.1 | 42.4 | 25.2 | 1.2 | 25.0 | 24.2 |
| Year — 1946 | .... | 454.1 | 204.2 | 109.0 | 3.3 | 97.7 | 83.7 |
| Monthly Average | .... | 37.8 | 17.0 | 9.1 | .3 | 8.1 | 7.0 |
| Year — 1947 | 4.2 | 648.4 | 289.7 | 160.1 | 4.7 | 146.9 | 127.2 |
| Monthly Average | .03 | 54.0 | 24.1 | 13.3 | .4 | 12.2 | 10.6 |
| Year — 1948 | 11.7 | 819.5 | 416.2 | 223.5 | 7.6 | 211.2 | 192.6 |
| Monthly Average | 1.0 | 68.3 | 34.6 | 18.3 | .6 | 17.6 | 16.0 |
| Jan.-June — 1949 | 8.2 | 243.5 | 269.6 | 148.8 | 4.1 | 64.8 | 119.8 |
| Monthly Average | 1.4 | 40.6 | 44.9 | 24.8 | .7 | 10.8 | 20.0 |

Source: Bipartite Commerce and Industry Group Monthly Statistical Bulletin of the Central Commission for Germany (Br. Element), Vol. IV, No. 2, Feb. 1949 and June 1949.

**IV—FRENCH ZONE PRODUCTION OF PRINCIPAL CHEMICALS**
(Metric Tons)

| *Chemical* | *1936** | *1947** | *1948** | *1949* (6 months)* | *% Increase or Decrease 1949 with 1936* |
|---|---|---|---|---|---|
| Nitrogenous Fertilizers (N) | 9,180 | 3,613 | 4,009 | 5,688 | −35 |
| Urea (N) | n.a. | 595 | 998 | 263 | .... |
| Sulfuric Acid ($SO_3$) | 16,840 | 2,542 | 3,505 | 5,084 | −70 |
| Sodium Carbonate | 2,884 | 1,943 | 3,205 | 4,627 | +60 |
| Chlorine | .... | 1,896 | 1,360 | 2,389 | .... |
| Calcium Carbide | 6,600 | 4,872 | 6,739 | 6,259 | − 5 |
| Methanol | n.a. | 1,655 | 1,996 | 1,777 | |
| Formaldehyde (30%) | n.a. | 1,980 | 2,573 | 2,836 | |
| Hydrochloric Acid (100%)** | n.a. | 439 | 493 | 848 (March) | |

* *Only monthly averages available.*
** *French Mensuel, April 1949.*

Source: Report on the Economic Evolution of the French Zone of Germany, High Commissioner of the French Republic in Germany.

Note: n.a.—Not available. Ludwigshafen-Oppau produced some methanol before the war and it operated a pilot plant where urea was probably produced; however, no production figures are available.

**Ovens in which carbide is cooked at the Sudentsche Kalkstickstoff-Werke AG fertilizer plant.**

The chemical industry of the Eastern Zone is considered of basic importance to the Two Year Plan. Every effort is being made to increase output of fertilizers, sulfuric acid, soda ash, calcium carbide, fatty acids, pharmaceuticals, and caustic soda; however, current production figures on these items are not published. Fertilizer production targets for 1950 have been announced, and indicate a goal of 180,000 tons of nitrogenous (N content) and 56,000 tons of phosphatic ($P_2O_5$ content). In the absence of present production figures, the veracity of these data is questionable.

Current information on specific commodity data is not available, but, such as is known of past operations is listed below. It is quite likely that present capacities are considerably in excess of those listed

*Sulfuric Acid*: Before the war, sulfuric acid output in what is now the Russian Zone accounted for about 20 percent of total German production of that commodity. A small percentage of this capacity was destroyed during the war, while more than half was removed by the Russians. Present production is 120,000 to 150,000 tons a year, about 15 percent of which is in the hands of Russian operators.

*Caustic Soda*: Five electrolytic plants are believed to have a combined annual output of 80,000 to 85,000 tons. By 1944, the Eastern Zone accounted for about 45 percent of total German production.

*Nitrogen*: The nitrogen-fixation industry lost most of its capacity through dismantling by the Russians. The wartime-built plants for the manufacture of synthetic nitric acid and nitrate of lime also have been dismantled. However, production of synthetic nitrogen in the first 11 months of 1948 at Luena increased to 160,000 tons (N content), compared with 30,000 tons in 1945. Considerable quantities were converted to ammonium sulfate, yielding a total of 550,000 tons. All of the Piesteritz plant where nitric acid, sodium nitrate and ammonium nitrate are produced have been removed.

*Calcium Carbide*: Prewar capacity in the Eastern Zone was about 240,000 tons a year, chiefly in the Piesteritz calcium cyanamide plant; output in 1943 was 575,000 tons. Today, the capacity is only 200,000 tons a year, but reported production is much less. The plants at Schopkau and Piesteritz were turned over to the Soviet Government under the Potsdam agreement.

*Phosphorus*: All of Germany's production before the war was confined to the present Eastern Zone at two plants—Piesteritz and Bitterfeld. Capacity at the former was 20,000 tons annually of phosphoric acid, in terms of $P_2O_5$. The modern furnaces at Piesteritz have been dismantled and removed, leaving only one furnace at Bitterfeld of 1,000 tons a year.

*Carbon Bisulfide*: Former capacity was over 100,000 tons a year in the Eastern Zone, but residual installations were reported to produce only about 12,000 tons.

*Synthetic Fuels*: Two large coal hydrogenation plants of Eastern Germany at Politz, near Stettin, and at Blechhammer in Upper Silesia, are now both in Polish-administered territory and are working to capacity; another one in the Soviet Zone was removed to Poland for reparation. Some of the remaining minor capacity is again in operation.

## POSTWAR RESTRICTIONS

In March 1946 the four occupying powers of Germany, acting through the Allied Control Authority, adopted a plan for reparations and the level of post war German economy. The objectives of the plan were to eliminate Germany's war potential, to provide reparations, and yet to leave sufficient capacity to permit the rebuilding of a viable, peaceful economy.

This plan imposed certain prohibitions and restrictions on the chemical industry. The manufacture of synthetic gasoline and oil, synthetic rubber and synthetic ammonia was prohibited, while the basic chemicals (which included nitrogen, phosphate, calcium carbide, sulfuric acid, alkalies and chlorine) were to be limited to 40 percent of the 1936 production capacity (measured by sales in 1936 values). Capacity of the pharmaceutical industry was to be retained for the annual production of 80 percent of the 1936 output, while dyes were to be limited to 36,000 tons, and synthetic fibers to 185,000 tons annually. Other chemicals were to be restricted to 70 per cent of the 1936 production capacity.

Inasmuch as many other industries are dependent on chemicals for their operation, the restrictions of the plan were found to be too binding to allow for a supply of chemicals sufficient for the needs of consuming industries, both within Germany and in other European countries. Accordingly, increases in production to approximately 98 percent of the 1936 level were authorized in 1947. However, whereas prewar production had consisted of large quantities of explosives and other chemicals for war purposes, plants for the manufacture of these commodities have been offered for reparations or declared for destruction.

As a result of an agreement signed by the Governments of the United States, Britain, and France in April 1949, practically all restrictions were removed from the production of chemicals in Western Germany. The few remaining prohibitions are to remain in force until the peace settlement, and the limitations until January 1, 1953, or until the peace settlement. These are:

1. The production of synthetic rubber and butadiene is prohibited.

2. During the war Germany had achieved considerable success in the production of synthetic liquid fuel from coal. Two methods were used—the Bergius hydrogenation process and the Fischer-Tropsch synthesis. The Western Occupying powers agreed, because of the world shortage of fats and oils, that operations be continued only at those plants then engaged in the synthesis of hydrocarbon waxes for the manufacture of synthetic fatty acids for producing soap and other detergents. This was to be permitted only so long as there exists in Germany a shortage of fats and oils, and in any event not beyond December 31, 1949.

3. Production of synthetic ammonia and chlorine is limited to capacity remaining after removal of plants marked for reparations.

4. Styrene production is limited to 20,000 tons annually.

### FOREIGN TRADE

Almost from its inception the German chemical industry has depended heavily on foreign markets as outlets for its surplus production. Chemical exports of an estimated $139 million dollars represented 15 percent of the total exports from the Bizone in 1936, thereby making up the third largest export item for the year, and were exceeded only by the Metal and Metal Products and Machinery and Optics groups. This contrasted with 1948, when exports of chemicals (by Joint Export Import Agency) valued at $30,267,000 represented slightly more than 5 percent of the total and ranked seventh in items of foreign trade. However, in the first half of 1949 alone, chemical exports amounted to $31,113,000.

German exports of chemicals represented a considerable portion of the entire world's chemical exports in 1936, exceeding those of the United States and other world chemical exporters. In 1948, Bizonal Germany had dropped to eighth among the world's chemical exporters, being surpassed by the United States (1), United Kingdom (2), France (3), Switzerland (4), Canada (5), Netherlands (6), and Italy (7). In the first half of 1949, exports increased to such an extent that the Bizone had moved up to sixth place among world chemical exporters, being surpassed only by the United States, United Kingdom, France, Canada, and Switzerland. Although substantiating figures are not available, it is evident that were exports for the whole of Germany considered, the country would have occupied at least fourth place among world chemical exporters during the first two quarters of 1949.

The principal chemicals, with the chief countries of destination, which were exported from the Bizone in 1948 are listed in Table V.

Chemical exports from the Bizone in 1948 were made up of the following groups:

| | *Total* $000 | *Monthly Average* $000 |
|---|---|---|
| Basic inorganic chemicals and products | 6,594.8 | 549.6 |
| Basic organic chemicals and products | 5,482.2 | 456.8 |
| Dyes | 7,157.6 | 596.5 |
| Paints, varnishes, lacquers, etc | 983.6 | 82.0 |
| Plastic materials | 1,231.2 | 102.6 |
| Fertilizer | 753.9 | 62.8 |
| Medicinal and pharmaceutical preparations | 3,088.0 | 257.0 |
| Other | 4,976.2 | 414.7 |
| Totals—1948 | 30,267 | 2,522 |
| Six months—1949 | 31,113 | 5,186 |

The ratio of exports to industrial production rose substantially during the latter half of 1948, although still well behind prewar. This was caused by the increased domestic consumption due to pent-up demand and economic uncertainties. Specifically, the ratio of chemical exports to production (1936 =100) rose from 10 in 1947 to 26 in 1948.

Bizonal Germany's prewar imports comprised mainly foodstuffs, raw materials, and semi-finished products. Chemical imports consisted principally of fertilizer materials (phosphate rock, nitrates, and basic slag), pyrites, coal-tar oils (Germany exports and imports coal-tar oils) and rosins. Imports of chemicals and related products into the whole of Germany in 1936 were valued at 202,400,000 marks (US $81,561,128 at the rate of one mark equals $0.40297). Fertilizers accounted for 23 percent of this total, or 47,222,000 marks (US $19,029,049).

In 1948, the value of chemical imports into the Bizone was $60,411,300. As in the prewar period, fertilizers and fertilizer materials again made up the largest single group, accounting for approximately 65 percent of this total. In the first six months of 1949, the value of imports was $39,157,000 (preliminary).

Imports of chemicals and related products in 1948, by general group headings, were as follows:

| | *1948* $000 |
|---|---|
| Basic inorganic chemicals and products | 3,240.1 |
| Basic organic chemicals and products | 8,164.5 |
| Compressed and liquid gases and chemical refrigerating agents | 189.3 |
| Paints, varnishes and lacquers | 484.2 |
| Fertilizers and fertilizer materials | 39,755.5 |
| Insecticides, fungicides and other agricultural chemicals | 473.8 |
| Plastic material, synthetic | 1,030.1 |
| Other | 2,225.3 |
| Total | 55,562.8 |
| Drugs and medicinal products | 2,535.7 |
| Toiletries, cosmetics, soaps, etc | 2,312.8 |
| Grand Total | 60,411.3 |

Although by the end of 1948 Bizonal Germany was able to pay for barely one-third of its imports without external financial assistance, there was a marked improvement over the situation which prevailed in the preceding year. The greatly stepped-up level of industrial activity allowed for an ever-increasing volume of exports, thereby gradually narrowing the wide gap between imports and exports.

The principal items of import, together with principal supplying countries, are shown in Table VI.

In 1947, trade agreements were made on the basis of "Lists of Preferred Goods" desired by Bizonal Germany and similar lists of commodities available for export. This formula was modified in the beginning of 1948, with the institution of fixed quotas, for which both parties agreed to issue import and export licenses. By the end of 1948, Bizonal Germany had made some 20 trade contracts, compared with 55 to which Germany had been party before the war.

There has been a major shift in

### V—PRINCIPAL CHEMICALS EXPORTED FROM BIZONE, 1948

| | *Metric Tons* | *$000* |
|---|---|---|
| COAL TAR DYES—Total | 1,836 | 7,984 |
| Sweden | 274 | 1,224 |
| Pakistan | 228 | 800 |
| Also to 39 other countries through out the world | 1,334 | 5,960 |
| MEDICINALS AND PHARMACEUTICALS—Total | 568 | 3,427 |
| Principal destinations: Great Britain, Switzerland, United States, Argentina, Sweden, and Denmark | | |
| POTASSIUM SULFATE—Total | 70,553 | 3,057 |
| Principal destinations: Great Britain, United States, Netherlands, Czechoslovakia, and Switzerland | | |
| SODIUM CHLORIDE—Total | 394,367 | 2,987 |
| Belgium | 229,922 | 1,492 |
| Denmark | 59,466 | 550 |
| Norway | 32,491 | 337 |
| Sweden | 30,242 | 293 |
| ZINC OXIDE—Total | 12,793 | 1,857 |
| Belgium | 8,191 | 838 |
| Great Britain | 1,419 | 239 |
| ETHER AND ALCOHOL—Total | 1,414 | 916 |
| POTASSIUM CRUDE SALTS—Total | 34,153 | 829 |
| Principal destinations: | | |
| Czechoslovakia | 21,241 | 647 |
| United States | 5,411 | 48 |
| OXALIC ACID—Total | 1,041 | 152 |
| United States | 942 | 131 |
| Switzerland | 87 | 16 |
| ACETIC ACID—Total | 10,484 | 300 |
| Switzerland | 4,497 | 120 |
| Belgium | 4,387 | 135 |

Source: "Foreign Trade Bizone Germany—1948."

### VI—PRINCIPAL CHEMICALS IMPORTED INTO BIZONE, 1948

| | *Metric Tons* | *($ Value not given) Reich Marks '000* |
|---|---|---|
| SUPERPHOSPHATES | 402,823 | 27,539 |
| Belgium | 267,687 | |
| United States | 44,087 | |
| Others: Italy, Netherlands, French North Africa | | |
| AMMONIUM NITRATE | 167,584 | 33,011 |
| United States | 144,820 | |
| Great Britain | 22,764 | |
| AMMONIUM CHLORIDE | 87,242 | 18,904 |
| Austria | | |
| STEARINE | 10,157 | 13,259 |
| United States | 8,141 | |
| MEDICINALS AND PHARMACEUTICALS | 655 | 7,459 |
| Great Britain | | 5,474 |
| PIGMENTS | 4,145 | 5,819 |
| Norway | 1,083 | |
| Sweden | 405 | |
| Australia | 418 | |
| Netherlands | 482 | |
| FERRO SILICON | 14,072 | 4,224 |
| United States | 8,911 | |
| Italy | 1,667 | |
| TURPENTINE OIL | 4,820 | 3,461 |
| United States | 2,789 | |
| Sweden | 1,774 | |
| SULFURIC ACID | 31,087 | 1,783 |
| Belgium | 28,082 | |
| Netherlands | 3,002 | |
| ARSENIOUS OXIDE | 3,052 | 1,123 |
| Poland | 704 | |
| Belgium | 673 | |
| Italy | 500 | |
| CALCIUM CARBIDE | 4,896 | 984 |
| Switzerland | 1,973 | |
| Norway | 1,100 | |
| SULFUR | 12,504 | 796 |
| United States | 12,439 | |
| Italy | 60 | |

Source: "Foreign Trade Bizone Germany—1948."

trade destinations in postwar Germany. In 1948, between 80 and 90 percent of this trade was with European countries. Notable among these were the United Kingdom, which took 25 percent of the Bizone's exports for that year; Belgium and Luxembourg, 16 percent; the Netherlands, 11 percent; Austria, 9 percent; and Denmark, 7 percent. This compares with the situation in 1936, when about one-half of Germany's exports were shipped to European countries, with a considerable portion of the balance going to Latin America.

Although Bizonal Germany at the end of 1948 was far from achieving its prewar position in world commerce, nevertheless several of the other industrial countries of the world were beginning to experience anxiety concerning renewed German trade competition.

### TRADE WITH THE U. S.

It is not possible to obtain a true appraisal of the measure of trade between the United States and Bizonal Germany, because the prewar statistics are, for the whole, of Germany and others are for the Bizone only. However, it is evident that United States shipments of chemicals and related products to the whole of Germany in 1936, valued at $8,430,616, represented 10 percent of the latter's total chemical imports ($81,561,128), in that year.

In 1948, United States exports of chemicals to *all of Germany* totaled $18,897,636. Total imports of these commodities by the *Bizone* in that year were $60,411,300, with an additional $7,854,800 imported by the French Zone, for a total of $68,266,100.

Before the war, and in 1948, fertilizers and fertilizer materials made up the bulk of chemical exports from the United States to Germany, accounting for 25 percent of the total in 1936 and 53 percent in 1948.

Germany's exports of chemicals and related products to the United States in 1948 were valued at $2,432,362. Total shipments of these commodities from the Bizone and French Zone totaled $41,292,988 in that year. Urea, produced in the French Zone, made up the largest single chemical item exported from the Bizone to the United States in 1948, accounting for 48 percent of the total. Potassium sulfate was the second item of importance, representing 25 percent of the total. Most of the balance was made up of shipments of potassium chloride, calcined magnesium sulfate, peat moss, oxalic acid, and medicinal and pharmaceutical products.

### TRADING WITH GERMANY

*Imports:* With few exceptions, imports into the three western Zones of Germany are supervised by the Import Advisory Committee at Frankfurt. This committee regularly issues lists of commodities approved for importation, countries of origin for each commodity, and funds available. These lists are published frequently (in German) in the Public Notices for the Bizonal Area, Frankfurt-Main 1, Postfach, U. S. Zone, Germany, and in many of the German trade papers. United States businessmen wishing to consult these lists may examine them in the offices of the European Branch, Office of International Trade, United States Department of Commerce, Washington 25, D. C., or subscribe to the German periodicals directly. In general, imports from the United States are limited to essential raw materials, staple foodstuffs, special machinery, etc.

German importers may negotiate directly with their foreign suppliers, applying to German foreign trade banks for import licenses. The banks are authorized to issue licenses for commodities appearing on the lists after referring the applications to the Central Commodity Budget Office, which coordinates the applications and insures that approvals do not exceed the approved quotas. In certain instances, the Import Advisory Committee may stipulate what shall be made by designated importers in which case Fund Allocation Certificates are issued to the designated parties and banks are authorized to issue import licenses without reference to the Central Commodity Budget Office.

Firms desiring to sell goods to Germany in any volume will often find it advantageous to engage a German agent, for which no approval by any Government agency is required.

*Exports*: Export transactions have been greatly facilitated by simplified procedures, which allow German manufacturers or exporters to negotiate directly with potential buyers. No approval of any occupying government or German government agency is required for export shipments to the Western Hemisphere, ERP countries, and the sterling area, with certain exceptions. (For complete details of "Trading with Germany," see Department of Commerce memorandum of November 1, 1949.) Payment for exports to the United States must be made in dollars to specially designated accounts. The German exporter receives the equivalent in German marks, converted at the rate of $0.238 per mark.

*Soviet Zone*: The top direction and control over foreign trade of the Soviet Zone rests with the Administration for Foreign Trade (Verwaltung fuer Aussenhandel) of the Soviet Control Commission, 1 Stuehlinger Strasse, (1), Berlin-Karlshorst, Sowjet Sector. Some of its licensing and planning authority has been delegated to the Administration for Interzonal and Foreign Trade (Hauptverwaltung fuer Interzonem-und Aussenhandel) of the German Economic Commission (Deutsche Wirtschaftskomission), 7 Leipziger Strasse (1) Berlin W 8, Sowjet Sector, and to the Land (State) Economic Ministries.

Some of the operating and advisory functions of the above organization (including advising foreign firms regarding all aspects of trade with the Soviet Zone), have been delegated to the German Government owned Deutscher Aussenhandel, Berlin m.b.h., Shickelstrasse 5-7, Berlin C. 2.

According to press reports, foreign firms must now contract directly with Government trading organizations, and private concerns are not permitted to enter into foreign trade contracts.

### SUMMARY

Because of the difficulty of creating an economically sound and stable Western Europe without a large German market, the Allied Military Government found it advisable to alter its earlier concept of a greatly reduced German industrial state and authorized a return to greater than the 1936 level of production.

The dependence of the Area on large imports of foodstuffs and industrial raw materials dictates the necessity for maintaining a high level of foreign trade, but some uncertainty exists as to the capacity of home and world markets to absorb the entire output of German industry. Even now, certain chemicals, notably organics, coal-tar dyes, and pharmaceuticals, are meeting with sales resistance both domestically and in export trade.

However, remarkable progress has been made toward achieving economic stability in Germany during the past year. Overall industrial production in October 1949 was 90 percent of the 1936 level. The general feeling of apathy, which prevailed from the war's end until mid-1948 has been replaced by a healthy spirit of recovery.

### SOURCES


Report "The German Chemical Industry," Foreign Economic Administration, Enemy Branch, October 1945.

"Bizonal Germany—1947-48, the Interrelation of Internal Economic Progress and Foreign Trade," by Analysis Branch, Civil Affairs Division, Department of the Army, May 1949.

Inter Allied Reparation Agency, Report of the Secretary General for the year 1948.

World Chemical Developments, report on Germany by Consul General, Frankfurt, Germany. 1936.

E.C.A. Report of October 2, 1948.

Report of the Military Governor for Germany (US), No. 48, *Reparations* (Cumulative Review)—September 1945-June 1949.

Statistical Annex, Report of the Military Governor, No. 49, July 1949.

Joint Export Import Agency Report for the Month of July 1949.

Publication, "Foreign Trade Bizone Germany"—1948.

# FASTER DRYING!

**PROTECTIVE COATINGS FORMULATED WITH**

# PENTEK®

*Pentek is available in 80 lb. multiwall bags. Illustrated booklet will be mailed promptly upon request on company letterhead.*

Heyden PENTEK (Pentaerythritol, technical grade), when properly used in formulation, possesses the valuable property of cutting down to a marked degree the drying time of paints, varnishes, lacquers and kindred products.

Varnishes formulated with PENTEK drying oils show shorter cooking schedules, less volatile loss and improved quality. Unusual durability, color retentivity and excellent adhesion characterize alkyd resins made with PENTEK. Rosin esters made with PENTEK are superior for the production of quick drying utility varnishes.

**DIPENTEK®**
(Dipentaerythritol, tech.)

**TRIPENTEK®**
(Tripentaerythritol, tech.)

# HEYDEN
## CHEMICAL CORPORATION

393 SEVENTH AVE., NEW YORK 1, N. Y.

CHICAGO 6 • PHILADELPHIA 3 • SAN FRANCISCO 11 • RUMFORD 16, R.I.

*Serving Industry* THROUGH FINER CHEMICALS

FINE HEYDEN CHEMICALS

Benzaldehyde • Benzoates • Benzyl Chloride • Bromides • Chlorinated Aromatics • Chlorobenzenes • Creosotes • 2,4-D • Formaldehyde Formic Acid • Glycerophosphates • Guaiacols • Hexamethylenetetramine Medicinal Colloids • Methylene Disalicylic Acid • Paraformaldehyde Parahydroxybenzoates • Penicillin • Pentaerythritols • Propyl Gallate • Quadrafos • Salicylates • Salicylic Acid • Streptomycin

another product of A&S research...

# The EXPENDABLE PALLET

Loaded A&S pallets being placed in freight car.

## Quick Facts About A&S Expendable Pallets . . .

1. Standard fork trucks may be used, making it unnecessary to change tubular forks.
2. You can unload car in fraction of regular time.
3. No upcharge to you for palletized shipment.
4. All bags laid flat—not folded.
5. Standard pallet size is 48" x 48", about 1500—2000 bags per pallet.
6. Cores alongside fork openings prevent blocking of fork entrance in shipment.
7. All-over wrapping gives bags greater protection.
8. Regular fork trucks can handle pallets, tunnels are 26" apart.
9. Strong car bracing prevents shifting of pallets in transit.

HERE'S the most modern and up-to-date expendable pallet used by the multiwall bag industry. This expendable pallet was designed and developed at the A&S Wellsburg, West Virginia plant, and patent applications have been filed to cover its unique features.

Packed under pressure, the compact, square bag unit is completely wrapped and then strapped to the A&S Expendable pallet. Already, A&S customers are reporting noticeable savings in their bag handling and storage costs. Follow these leaders and put to profitable use the "plus" packaging features being developed in the A&S Packaging Laboratories.

ARKELL & SMITHS · 90 YEARS OF KNOW HOW · THE OLDEST NAME IN PAPER BAGS ·

**ARKELL and SMITHS**

CANAJOHARIE, N. Y. · WELLSBURG, W. VA. · MOBILE, ALA.

# THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES

## PEOPLE

GEO. L. ARMOUR succeeded B. R. Armour as president of American Aniline Products.

J. P. REMENSNYDER, president of Heyden Chemical Corp., also succeeded B. R. Armour.

EARL L. WHITFORD, new president and treasurer of Oldbury Electro-Chemical Co.

LEE H. CLARK has been named executive vice-president of Sharples Chemicals, Inc.

PAUL KENDALL, former Sharples executive vice-president, has been elected president.

H. E. BRAMSTON-COOK, Eastern general sales and product development manager of Oronite Chemical Co., made a vice-president.

WM. G. KRUMMRICH, general manager of Monsanto Chemical Co.'s Organic Chemicals Division, has been elected to a vice-presidency.

# MAN-MADE MICA

**Synthetic mica, in some ways superior to the natural product, is made at the Bureau of Standards.**

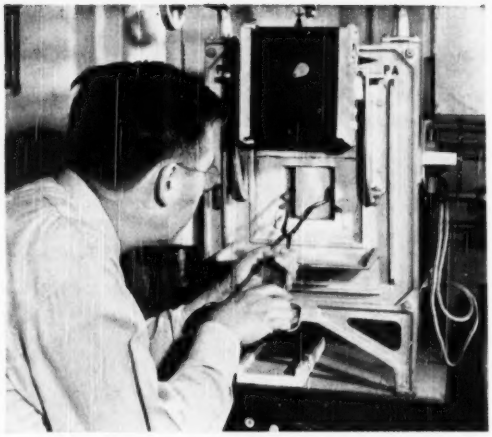
ABLE TO WITHSTAND much higher temperatures than natural mica, a new synthetic product has been successfully crystallized by researchers at the National Bureau of Standards. This work is part of a broad program of research on fluorine-containing artificial minerals sponsored by the Office of Naval Research. The mica phase has been carried out in cooperation with the U. S. Bureau of Mines and the Colorado School of Mines.

Requirements of eventual quantity production were kept in view. Mica could be synthesized by duplicating the conditions under which it is formed in nature, but this would involve extremely high temperature and pressure. The Bureau's scientists grow crystals without using high pressure.

Raw materials are quartz, magnesite, bauxite, and potassium fluosilicate. The mixture is placed in a platinum-lined crucible and melted in an electric furnace at about 1400° C. As the furnace cools, mica crystals grow from a tiny seed at the bottom of the crucible.

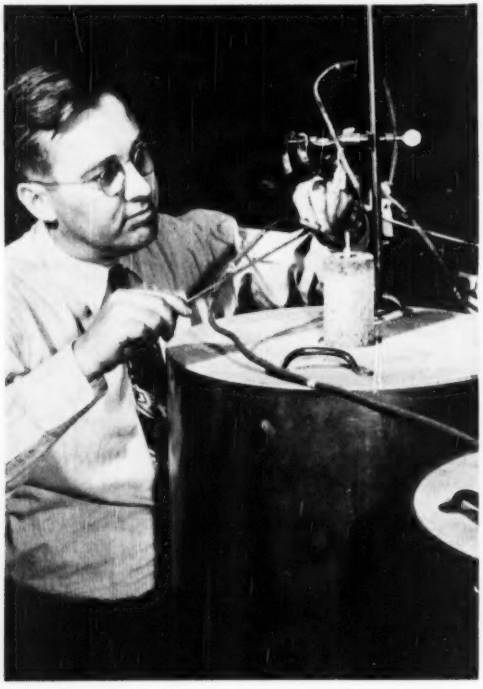
The most satisfactory synthetic mica developed so far has the formula $K_4Mg_{12}Al_8Si_{12}O_{40}F_8$. This is equivalent to a form of natural mica in which fluorine replaces hydroxyl radicals.

Satisfactory synthesis depends to a large extent on the materials used in the crucible lining. Ceramic linings are badly corroded by a fluorine-bearing melt. Carbon and silicon carbide are somewhat better, but platinum foil gives the best results.



**RAW MATERIALS** (except for the fluosilicate) are calcined to drive off water and carbon dioxide which would hinder crystallization.

**CALCINED** materials are ground with the fluosilicate and packed in a cylindrical, cone-bottom platinum lining (0.003") of a crucible.



**CHARGE** is lowered into electric furnace to melt at 1400° C. Thermocouples record temperature as furnace cools and crystals grow.

**PLATINUM LINING** is stripped from cooled mass for melting and reuse. Individual crystals are then separated for examination.

**Cupric Sulfate**

**Fine Cryst., Reagent, A.C.S.**

$CuSO_4 \cdot 5H_2O$ M.W. 249.71

**MAXIMUM LIMIT OF IMPURITIES**

| | |
|---|---|
| Insoluble | 0.005% |
| Cl | 0.001% |
| Subs. not ppt. by $H_2S$ | 0.10 % |
| $NH_4OH$ Precipitate | 0.01 % |
| $(NH_4)_2S$ Metals except Fe (as Ni) | 0.01 % |

# Above All Else...PURITY

Typical B&A Reagents
Used In
Clinical Laboratories

Acetic Anhydride, Reagent, A.C.S.
Acetone, Reagent, A.C.S.
Acid Carbolic, Loose Crystal, Reagent
Acid Hydrochloric, Reagent, A.C.S.
Acid Nitric, Reagent, A.C.S.
Acid Phosphoric, Meta, Glacial, Pellets, Reagent
Acid Picric, Crystal, Reagent; Special for Blood Test
Acid Sulfuric, Reagent, A.C.S.
Acid Trichloracetic, Crystal, Reagent
Alcohol Methyl, Acetone Free, Reagent, A.C.S.
Ammonium Thiocyanate, Crystal, Reagent, A.C.S.
Calcium Chloride, Anhydrous, Reagent and Purified
Ether, Anhydrous, Reagent, A.C.S.
Lithium Sulfate, Powder, Reagent
Potassium Cyanide, Granular, Reagent
Potassium Oxalate, Crystal, Reagent, A.C.S.
Sodium Carbonate, Anhydrous, Fine Granular, Reagent, A.C.S.
Sodium Potassium Tartrate, Crystal, Reagent, A.C.S.
Sodium Tungstate, Reagent, A.C.S.; According to Folin
Xylene, Reagent, A.C.S.
Quantitative Filter Papers

In hospital and clinical laboratories . . . in medical research . . . purity must be the paramount consideration in choosing reagents. So much depends upon so little; there can be no compromise on chemicals where life and health are concerned.

That is why laboratories America over specify B&A Quality Reagents. They know B&A products can always be used with complete confidence. Behind B&A stands 68 years' experience in producing reagents of highest purity for careful analytical work.

Typical of the many B&A reagents especially suited for the clinical laboratory is Cupric Sulfate, Fine Crystal, Reagent A.C.S. for sugar determinations. Note the strict limitations on impurities listed above. Here is the type of reagent demanded by those who want *purity above all else* . . . the type of reagent for which B&A is recognized. For the best in laboratory chemicals—make B&A your choice too.

REAGENTS
B&A
STANDARD OF PURITY
FINE CHEMICALS

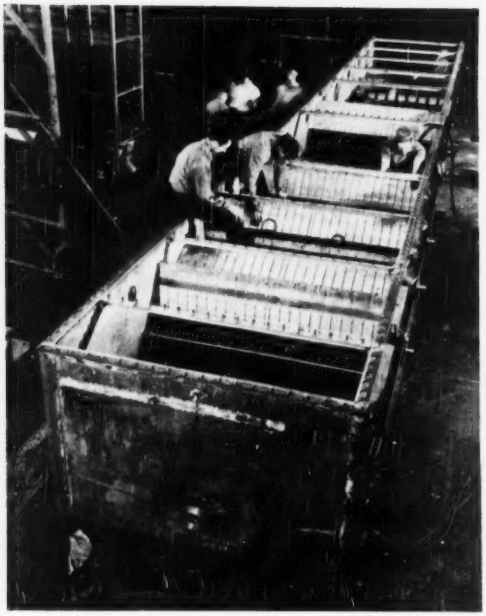
## BAKER & ADAMSON *Reagents*

**GENERAL CHEMICAL DIVISION**
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.

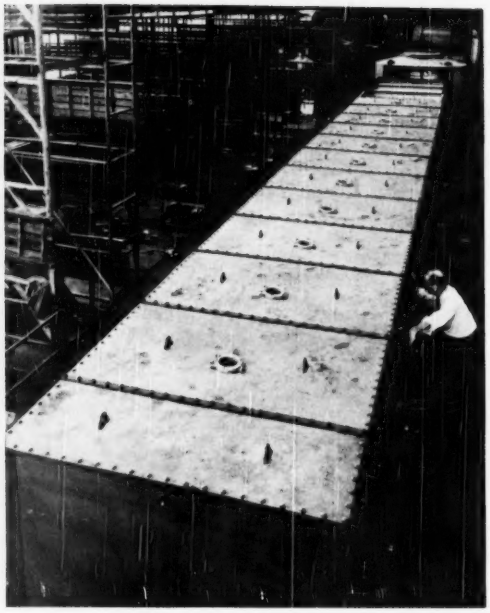
*Offices:* Albany* • Atlanta • Baltimore • Birmingham* • Boston* • Bridgeport* • Buffalo* • Charlotte* Chicago* • Cleveland* • Denver* • Detroit* • Houston* • Kansas City • Los Angeles* • Minneapolis New York* • Philadelphia* • Pittsburgh* • Portland (Ore.) • Providence* • St. Louis* • San Francisco* Seattle • Wenatchee (Wash.) • Yakima (Wash.)
In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.
In Canada: The Nichols Chemical Company, Limited • Montreal* • Toronto* • Vancouver*

SETTING THE PACE IN CHEMICAL PURITY SINCE 1882

* Complete stocks are carried here.



**ABOUT 2500 WELDED STUDS** were used on this 68-foot-long solvent extractor. Normal procedure would have been to drill and tap.



**THE COVER PLATES** are, instead, merely slipped over the studs along the perimeter. Tie bars are placed between plates to hold them.

# WELDING CUTS COST

**Extensive welding cuts time, material in fabrication of solvent extractor.**

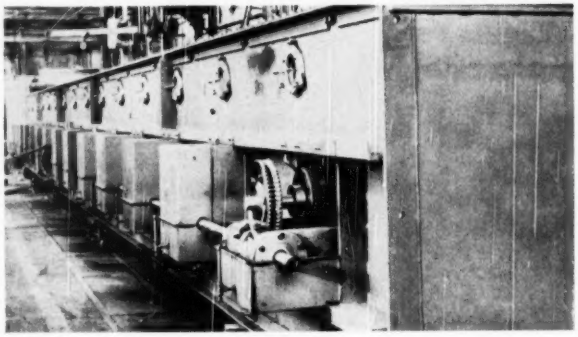
EXTENSIVE use of modern welding techniques by The Vulcan Copper & Supply Co. cut the cost of its Kennedy stainless-steel solvent extractor by sharply reducing the amount of steel required.

It is often necessary to weld bosses or flanges to the frame to obtain sufficient tapping depth for the studs, but all of this material and labor was saved by use of stud welding. In addition, this technique eliminated the drilling and tapping that would have been needed for the 2500 studs used at various points on the frame.

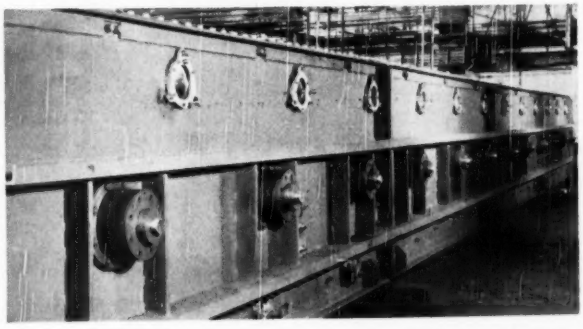
Stud welding was used at five different steps in the fabrication procedure to obtain important manufacturing economies and improved design. Stud location was first determined by the usual layout and center punch method. The welding operator then chucked the stud and protective ceramic ferrule in a portable Nelson stud welding gun, placed the point of the stud in the center punch mark, and pulled the trigger. The entire operation was completed in a few seconds.

In fabricating the impeller wheels the slats were spot-welded to the wheel tie bars, which were then fastened to the wheel frame by studs welded to the frame members.

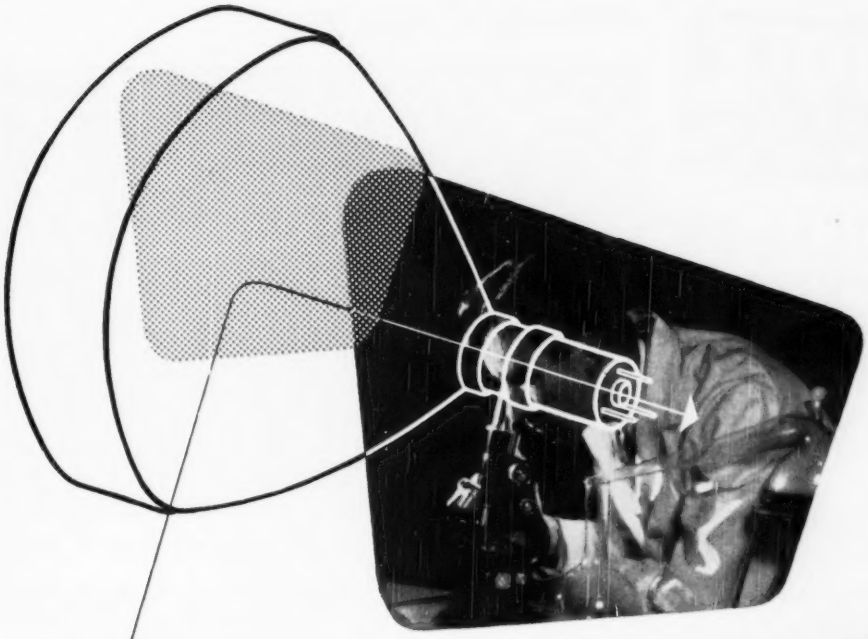
Power was supplied by a 400-amp. DC welding generator. Lengths of welding cable enabled the operator to make several welds without moving the equipment.



**SIDE VIEW SHOWS** four different applications of welded studs: to hold the cover plates, to secure the portholes, on the bearing housings, and on the drive covers.



**OTHER SIDE** shows series of bearing housings fastened with $\frac{1}{2}$"x2$\frac{1}{2}$" welded studs. The sight glasses above are installed by means of $\frac{3}{8}$" x 2" stainless-steel studs.



# THE VISION BEHIND YOUR TELEVISION SCREEN

***Mallinckrodt Chemicals of almost unbelievable purity help "brighten the picture" in TV—and many other products***

The quality of a television image depends largely on the quality of the chemicals that go into the complex makeup of the tube: cathode emissive material, phosphors, and screen-laying solutions.

Typical of the Mallinckrodt Fine Chemicals for television is our special grade of *Sodium Sulfate*. Impurities are reduced to such infinitesimal traces that chemists can scarcely believe its analysis (left).

The far-sighted vision of Mallinckrodt research that gives the industry such products today may give *your products* better reception tomorrow. Starting materials of Mallinckrodt uniform purity help reduce rejects, maintain higher quality at lower cost in many plants. They may do the same in yours, too. Call your nearest Mallinckrodt representative or write:

QUANTITATIVE SPECTOGRAPHIC ANALYSIS OF A
**TYPICAL LOT OF MALLINCKRODT SPECIAL SODIUM SULFATE**

| | | |
|---|---|---|
| Copper | | 0.3 ppm |
| Silver | Less than | 0.1 ppm |
| Bismuth | Less than | 0.1 ppm |
| Cobalt | Less than | 0.5 ppm |
| Chromium | Less than | 0.5 ppm |
| Cesium | Less than | 0.1 ppm |
| Iron | | 0.2 ppm |
| Lithium | | 0.9 ppm |
| Manganese | Less than | 0.1 ppm |
| Nickel | Less than | 0.5 ppm |
| Aluminum | | 15.0 ppm |
| Barium | Less than | 0.1 ppm |
| Cadmium | Less than | 0.1 ppm |
| Lead | | 1.2 ppm |
| Silicon | Less than | 1.0 ppm |
| Tin | | 0.3 ppm |
| Strontium | Less than | 0.1 ppm |
| Titanium | Less than | 0.5 ppm |
| Zinc | Less than | 1.0 ppm |

**MALLINCKRODT CHEMICAL WORKS**

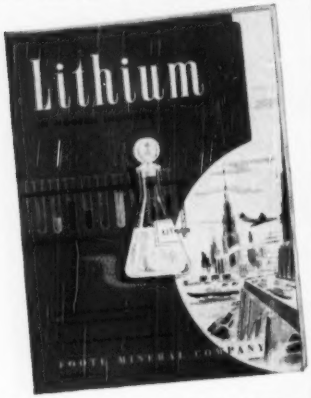
Mallinckrodt St., St. Louis 7, Mo. / 72 Gold St., New York 8, N. Y.

CHICAGO • CINCINNATI • CLEVELAND • LOS ANGELES • MONTREAL • PHILADELPHIA • SAN FRANCISCO
Manufacturers of Medicinal, Photographic, Analytical and Industrial Fine Chemicals

FOOTE
MINERAL
COMPANY

# REPORTS ON LITHIUM CHEMICALS

A concise discussion for research and development chemists of the varied and significant applications of lithium and its compounds which have rapidly taken their place in industrial chemistry.




For an over-all evaluation of the more recent realities in the profitable use of lithium chemicals send for your copy of "Lithium in Modern Industry", recently published by Foote Mineral Company.

Many commercially valuable products have resulted from the proper application of the properties of this unusually versatile element.

Foote Research in Lithium has always been on the industrial level, and this new publication is an unbiased reporting of the facts as of today.

Your request upon company letterhead would be greatly appreciated.

CHEMICALS ORES
METALS ALLOYS

Foote
MINERAL COMPANY
A Step Ahead in Industrial Ores and Chemicals

HOME OFFICE: 401 Eighteen West Chelten Building, Philadelphia 44, Pa. Research and Development Laboratories: Philadelphia 44, Pa. Plant: Exton, Pa.

## CHECKING THE CHECKERS

LABORATORY THERMOMETERS are checked in a constant-temperature water bath.

ACCURACY of hydrometers is determined in a pure liquid of known specific gravity.

**Texas Co. has own "bureau of standards" to check equipment.**

AT ITS BEACON, N. Y., research center the Texas Co. has a standardization laboratory that checks an estimated 60,000 pieces of equipment a year. This equipment is used at twenty refineries and seventeen terminal laboratories throughout the world. Such instruments as stopwatches, viscosity pipettes, hydrometers, and thermometers are compared at Beacon against known standards before being shipped to the various Texas refineries. Experts from the Beacon organization make annual tours to make sure that test procedures are being conducted "according to Hoyle." Such tests include knock rating, fractional distillations, and analyses with the mass spectrometer and infra-red spectrometer. Identical samples of commercial petroleum products are shipped periodically to other laboratories for independent checking of test results. The Beacon researchers are also responsible for devising new and improved test methods.

# WHY SETTLE FOR LESS?

# Nacconol NR*

## THE BALANCED DETERGENT

### COMBINES

**Fast penetration**
**Thorough wetting**
**Excellent detergency**
**Good emulsification**
**Superior dispersion of mineral salts**
**High stability to acids, alkalis, oxidizing and reducing agents**
**Rapid rinsability**
**High efficiency at low concentrations**
**Economy in hot or cold solutions over a wide pH range**

**NO OTHER SOAP OR DETERGENT DOES SO MUCH FOR SO LITTLE!**

For prompt shipment from nearby stocks, write, wire or phone nearest office.

**NATIONAL ANILINE DIVISION** ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y. (BOwling Green 9-2240)

| | | | |
|---|---|---|---|
| Boston, Mass., 150 Causeway St. | Capitol 0490 | Greensboro, N.C., Jefferson Standard Bldg. | Greensboro 2-2518 |
| Providence, R. I., 15 Westminster St. | Dexter 3088 | Atlanta 2, Ga., 140 Peachtree St. | Cypress 2821 |
| Chicago 54, Ill., Merchandise Mart Bldg. | SUperior 7-3387 | Chattanooga 2, Tenn., James Building | Chattanooga 6-6347 |
| Philadelphia 4, Pa., 200-204 S. Front St. | LOmbard 3-6382 | New Orleans, La., Cotton Exchange Bldg. | Raymond 7228 |
| San Francisco, Cal., 517 Howard St. | Sutter 7507 | Portland 9, Ore., 730 West Burnside Ave. | Beacon 1853 |
| Charlotte 1, N. C., 201-203 West First St. | CHarlotte 3-9221 | Toronto, Canada, 137-145 Wellington St. W. | Elgin 6495 |

*Reg. U. S. Pat. Off.

# CHEMICAL SPECIALTIES

## How to Launch a Household Specialty

by CHARLES DUPUY
Charles Dupuy Associates, New York, N. Y.

**GOOD SPECIALTIES are no better than their sales outlets. Promotion know-how and imagination can win them.**

**Department store demonstrations are effective in introducing new products.**

HOUSEHOLD chemical specialties looks like an attractive field for a prospective manufacturer. It is, for it's about the cheapest to get into, since anyone with a formula can take a crack at the fabled—and still possible—method: Cut the head out of a drum for a mixer; buy raw materials, a few bottles, labels and caps; and go to work in his garage.

But the job has only begun. Selling is as important as a good product, and it is failure to get the product on dealers' shelves and into consumers' hands that is responsible for the high mortality rate in this business.

One way to launch a new product in a modest way is to locate a dealer in the home town, tell him about the new venture, and ask his advice on various selling problems. He may give some valuable tips, but more important is getting him to take an interest in the product. He'll try to justify the confidence placed in his judgment.

The dealer and any clerks he may have should receive samples to take home and try out; their reactions as users are valuable in forming ideas for future sales promotion, and they know how to use the product and what it will do. When they tell of different uses they have discovered for it, it helps to build enthusiasm if these are received gratefully as new ideas whether they are or not.

When the new specialty is accepted, a window display should be promoted, and the store owner given help in setting it up. On busy days particularly, it's a good idea to drop in and demonstrate the product if such an arrangement can be made. During this time the product should be promoted and demonstrated house-to-house by the manufacturer or his men, if any, and all orders turned over to the dealer. Another aid is to have circulars printed (the shorter and snappier the better) that the dealer sends out with his bills to charge customers. When it can be afforded, advertising in the local paper will increase the effectiveness of the promotion. A mat of a standard ad, with a space for a dealer's name, should be prepared so that the claims and description of the product are uniform wherever it is sold.

This effort is repeated in surrounding towns until eight to a dozen dealers are moving the product in their stores. With this record of a live market as scenery, a jobber can be approached and usually sold on adding the item to his line. The product is now on its way, and its success is limited only by the imagination and effort put into its promotion.

### PRICING AND DISCOUNTS

Pricing a household specialty improperly, however, can ruin it before it gets started, for many new manufacturers, thinking only of relatively low raw materials cost, put too low a price tag on it. It should retail at a minimum of four times the cost of the finished product. A number costing 25¢ to make should not sell for less than 98¢, and preferably should retail for $1.25.

However, the cost should not be arrived at on the basis of small quantity purchases. It is a simple matter to find the cost of various articles of manufacture purchased in reasonable quantities as they will be when the enterprise really gets rolling, and arrive at a proper sales price.

Discounts to dealers should be one-third off the retail price. A jobber should get 25% off the dealer price making the price to him 50% of retail. For example, an article retailing for $1.50 will sell to the dealer for $1.00, and to the jobber for 75¢. Some manufacturers give 40% and 25%, making a total of 55% off retail the price to the jobber.

While building up slowly and securing distribution through jobbers is effective, promotion through department stores in cities is a sales

## *If you need a*
# VERSATILE CHEMICAL WORKHORSE

## Specify Pfizer OXALIC ACID

Pfizer Oxalic Acid will work as hard for you on rough, tough jobs as a pure-bred percheron stallion. No matter what your use for Oxalic Acid is—whether your process calls for bleaching, acidifying, polishing or the synthesis of other chemicals, Pfizer Oxalic Acid will meet your requirements. The properties of Pfizer Oxalic Acid are standardized to make it a worthy companion to Pfizer Oxalates—long established for their reliability and uniformity throughout industry. Extensive experience and facilities make Pfizer potentially the world's largest source of Oxalic Acid. Thus, you are assured of a basic and dependable source of supply. Pfizer Oxalic Acid, Technical is immediately available as a free-flowing, white, granular chemical packed in 325 pound drums. Write today for samples and prices to: Chas. Pfizer & Co., Inc., 630 Flushing Avenue, Brooklyn 6, N. Y.; 425 North Michigan Avenue, Chicago 11, Ill.; 605 Third Street, San Francisco 7, Calif.

**PFIZER OXALATES**

**AMMONIUM OXALATE TECHNICAL**
**IRON AND AMMONIUM OXALATE (Ferric)**
**IRON AND POTASSIUM OXALATE (Ferric)**
**IRON AND SODIUM OXALATE (Ferric)**
**IRON OXALATE GRANULAR (Ferric)**
**POTASSIUM OXALATE NEUTRAL TECHNICAL**

PFIZER

*Manufacturing Chemists for Over 100 Years*

Basic Chemicals for Agriculture

2,4-D

Acid

Sodium Salt

Butyl Ester

Isopropyl Ester

40% Butyl Ester Sol.

44% Isopropyl Ester Sol.

Amine Salt Solution

DDT

100% technical grade

wettable powder

dust concentrates

emulsifiable solutions

KOLKER

Chemical Works, Inc.

Manufacturers of Organic Chemicals

80 LISTER AVE., NEWARK 5, N. J.



method that can win a large market if properly handled. A majority of the well-known household specialties got started this way, for identification with a reputable store establishes a name for the product. This makes its acceptance in department stores in other large cities easier, and interest and sales snowball as city after city is added to the program.

Before approaching a department store buyer, it is best to check traffic points in the housewares or chemical specialties department to determine the busiest spot. With that as a goal, and a definite proposition in mind, the seller tackles his first customer, the buyer. Here is where many, more intent upon getting an order than on generating enthusiasm for the product and its sales possibilities, fall down.

### DRAMATIC PRESENTATION

The new item should be demonstrated to him as dramatically and enthusiastically as it will be to the public. He should be told what type of demonstration is planned for the store if the prize space is granted, and he should be consulted on obtaining a good demonstrator. This expense will be borne by the manufacturer and will run $40-$50 a week with a commission on a quota—usually 5% on all sales above $100 a week. The type of specialty will generally dictate what kind of "pitch" should be used—"open" demonstration in which a continuous fire of arguments is used to gather a crowd, or a "closed" demonstration in which demonstrator stands near a table and quietly trys to stop people. A stunt demonstration such as the fountain of foam in the accompanying picture should be used only if the product has sensational possibilities.

Here again it is important to have samples spread freely among the workers in the store so they will use the product at home and know what it can do. Before the demonstration is to open, it is wise to request the buyer to call a brief sales meeting at which the clerks are given samples and told about the product and its location in the department. If the product can be used in the store, the maintenance crew should get it and use it. Most of the large department stores have a telephone order board composed of people trained to sell over the phone. These salespeople should be cultivated to aid in the promotion.

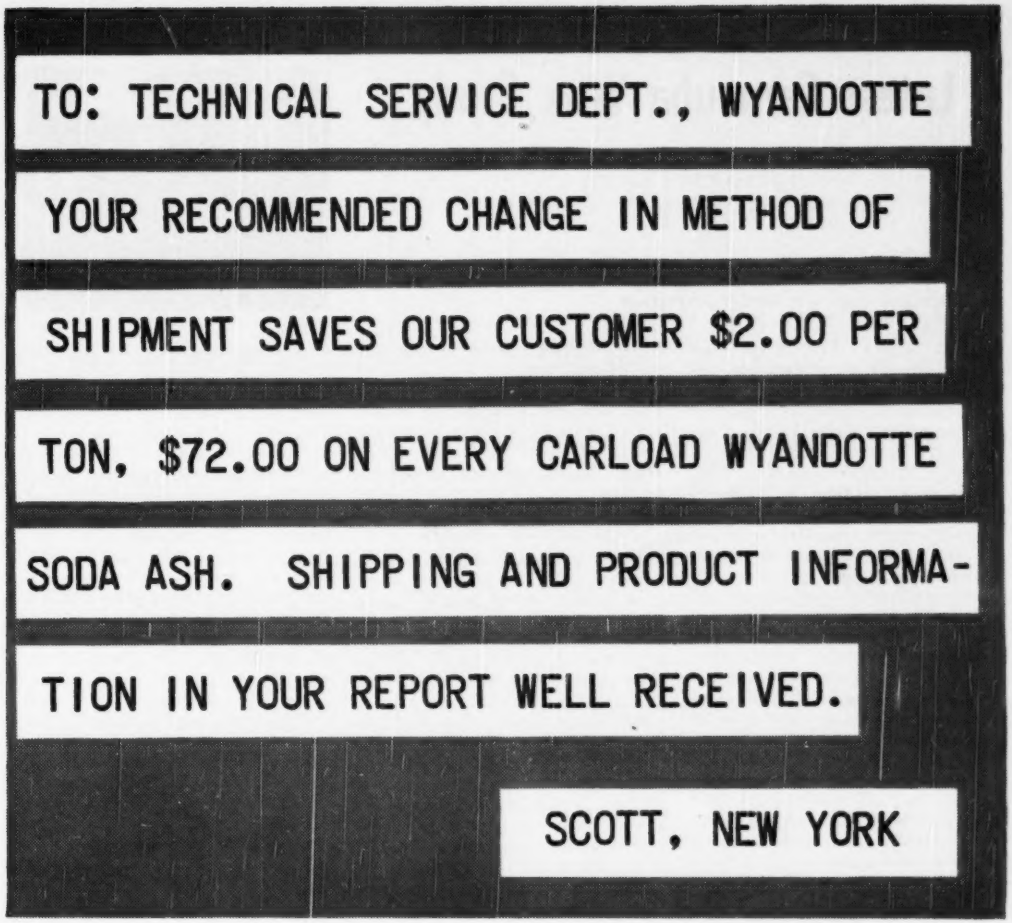
Cooperative advertising is generally used to promote the product in the daily papers. The manufacturer may have to pay the entire cost or may be able to get the store to share this expense. A good bargain here is important since the law requires that the arrangement agreed upon must hold for cooperative advertising done with any other store. Advertising a new product under the name of a nationally known store immediately puts it in the "class" line, and greatly eases distribution problems. In addition, circulars should be sent out with monthly bills, but this may take a lot of talking, for in a big store the product will be competing with a great number for the same privilege.

A department store will not take less than a 40% discount off the retail price, but the larger volume that can be moved makes up for this lower profit margin. Most generally, too, on the initial order, there must be a guarantee that the manufacturer will take back any unsold stock at the close of the demonstration. Repeat orders, however, will be on regular selling terms. It is unwise to expect a repeat order in less than three months, and sufficient capital should be allocated to keep a demonstration going that long without such income.

### NAME'S THE THING

When a product has established a record of performance in a store like Gimbel's or Wanamaker's in New York City, for example, placing it in Wanamaker's or Strawbridge & Clothier in Philadelphia or similar stores in other cities is a lot simpler than the original promotion. In this way, the product continues to accumulate quality outlets. One pitfall to be avoided, however, is allowing it to be handled by second-rate stores. If it can't be placed in the best department stores in a city, that area should be skipped until they can be cracked rather than have it served by a store that is not identified with top merchandise. With record of acceptance in a number of reputable outlets, national distribution can be undertaken if the enterprise is of sufficient stature.

Although it is a fairly simple matter to outline the principles of promoting a new household chemical specialty, it is a very tough and highly competitive business. Only those who have complete faith in their product, imagination and skill in finding ways to promote it, and facility in spreading enthusiasm for it should tackle this end of the business. It takes a certain amount of money to survive the first years until the repeat orders start coming in. No amount of money, however, can make a manufacturer a success unless he is the type who can promote his product in this way, or find someone for his organization who can.


TO: TECHNICAL SERVICE DEPT., WYANDOTTE
YOUR RECOMMENDED CHANGE IN METHOD OF
SHIPMENT SAVES OUR CUSTOMER $2.00 PER
TON, $72.00 ON EVERY CARLOAD WYANDOTTE
SODA ASH. SHIPPING AND PRODUCT INFORMA-
TION IN YOUR REPORT WELL RECEIVED.
SCOTT, NEW YORK

Here is another example of Wyandotte Technical Service at work. In this case, the customer had been buying Soda Ash in bulk from box cars. The recommendation, based on a study of his unloading facilities and other factors, was that he switch to hopper cars. The results were a faster, cleaner unloading operation, plus a substantial saving in labor as well as material costs.

Wyandotte's skilled Technical Service staff stands ready to help you choose the proper grade of Wyandotte Soda Ash, the proper container for shipment and the best method of transportation — and to help you answer other related problems — based on your particular location, applications, storage and handling facilities.

For general product, shipping and other useful information concerning Wyandotte Soda Ash, just write:

**Wyandotte Chemicals Corporation**
Wyandotte, Mich. • *Offices in Principal Cities*

SODA ASH • CAUSTIC SODA
BICARBONATE OF SODA
CALCIUM CARBONATE • CALCIUM CHLORIDE
CHLORINE • HYDROGEN • DRY ICE
SYNTHETIC DETERGENTS • GLYCOLS
CARBOSE (Sodium CMC) • ETHYLENE DICHLORIDE
PROPYLENE DICHLORIDE
AROMATIC SULFONIC ACID DERIVATIVES
OTHER ORGANIC AND INORGANIC CHEMICALS

Wyandotte
REG. U. S. PAT. OFF.

# Latest Carnauba Wax Study

by CHARLES J. MARSEL
New York University, University Heights, N. Y.

**CRITICAL STUDY of certain carnauba wax characteristics provides wax importers and users with needed information.**

CARNAUBA WAX has been known for many years, and used industrially for over fifty years. However, like many natural products, there is a considerable range in physical and chemical properties among various grades sold commercially.*

To remedy this situation, the American Wax Importers and Refiners Association, Inc., sponsored a project in the Chemical Engineering Department of New York University to investigate and improve well-known wax tests, and to obtain accurate test values from a wide variety of samples as a basis for standard specifications. The work was done in close co-operation with the Qualities Committee of the association, and was performed by Leonard Kramer and William Morton under the direction of the author. It represents the first comprehensive critical study of carnauba in over thirty years, and the information obtained should prove of value to manufacturers handicapped by lack of published data on this raw material.

In all, 56 samples of crude carnauba wax were received expressly for this project. Most of them were sealed samples sent directly from the more important Brazilian exporters at the association's request; some were received from member firms of the association. The waxes were classified into four groups:

Group I (19 samples), #1 yellow and #2 yellow. These are prime waxes, obtained by cutting the smaller and less mature leaf. The difference in color between the two grades is usually not great.

Group II (6 samples), Cauhypa and North Country #2. Their excellence in color is approximately in the order named.

Group III (25 samples), Fatty Grey and North Country #3. This represents wax obtained by cutting the mature leaf, and because of longer exposure is much darker in color than the yellow.

Group IV (6 samples), Chalky wax. This represents wax obtained by adding water during the melting process, and as such has a high water content, giving the characteristic chalky appearance.

## DESCRIPTION OF TESTS

All crude samples were received as chunks. They were ground to about 5 mesh, and stored in sealed containers; representative test samples were taken by standard cone and quartering method. Following are descriptions of tests that were made (full details will be published later):

*Dirt and moisture.* This was carried out in one combined apparatus, a Soxhlet extractor with a Dean-Stark water-trap on top. Solvent used was toluene, previously saturated with water. Comparison of results from this apparatus with results obtained by running separate tests for dirt and water using an individual Soxhlet extractor and Dean-Stark apparatus indicated no differences. Precision: ± 0.5%.

*Flash point.* This was the standard A. S. T. M. method, using the Cleveland Open Cup tester. Crude wax was kept at 110° C. for 24 hours to evaporate water and allow dirt to settle. Then sample was obtained by decanting from dirt. Precision: ± 5° F.

*Melting point.* Standard method of open capillary tube in water bath. Pretreatment was the same as for flash point. Melting point was taken as that temperature where free rising of wax was noted. Precision: ± 0.2° C.

*Acid number.* Considerable improvement was made on the ordinary test. The improved test involved the use of a new combination of solvents, and a phenolphthalein indicator in a masked solution. Solvent was a mixture of isopropyl alcohol, n-amyl alcohol, and toluene. This mixture was later miscible, gave a sharp indicator end-point, and was an excellent wax solvent when hot. Use of phenophthalein indicator with methylene blue as a masking agent gave a sharp end-point, by neutralizing color effects of the wax. Precision: ± 0.2.

*Saponification number.* These were run using the same indicator as for acid numbers, and using caustic dissolved in the same solvent. A critical study was made of effect of caustic concentration, time, and temperature on completeness of saponification. The test as finally modified represents a substantial improvement over existing methods, and is especially useful for dark-colored wax. Test conditions used insured complete saponification. Precision: ± 1.5.

*Iodine number.* Standard method using Hanus solution and trichlorothylene as solvent. A critical study showed that in order to obtain reproducible results, sample weight, solution concentration, and reaction time must be carefully controlled. Precision: ± 0.2.

*Emulsification.* Carbide and Carbon formula, using oleic acid, triethanol amine, borax, and water. Gloss was measured on standard sheets. Since

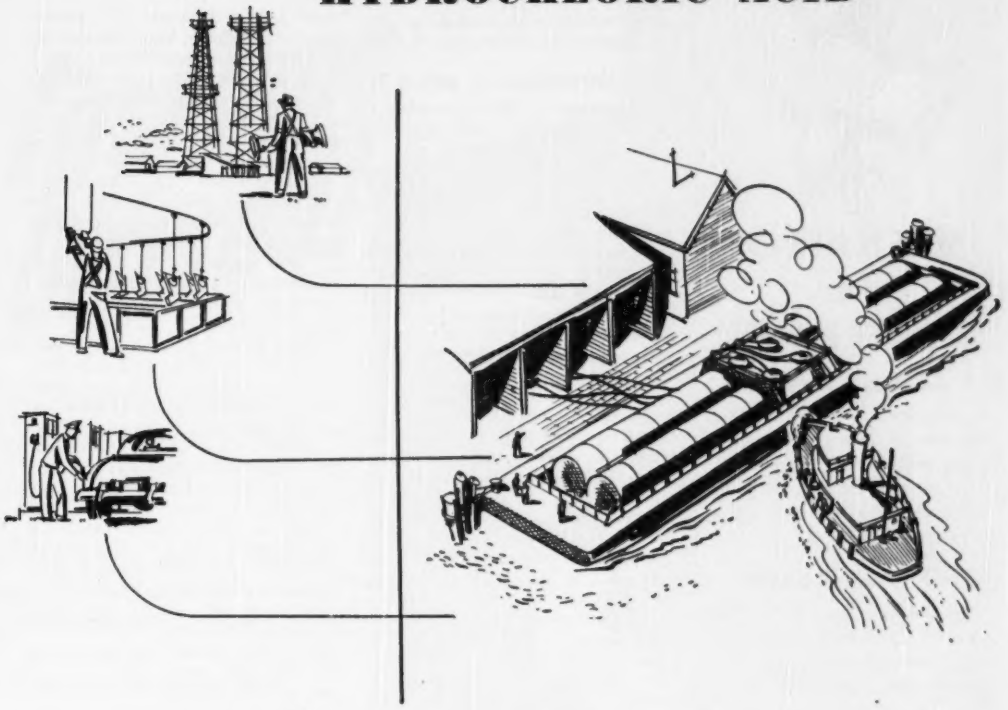
**SUMMARY OF TEST VALUES CHARACTERIZING CARNAUBA WAX**

| *Group* | *Sapon. No.*[2] | | *Acid No.*[2] | | *Melting Pt.* | | *Flash Pt.* | | *Iodine No.*[2] | |
|---|---|---|---|---|---|---|---|---|---|---|
| Range | Ovr'l | 90%[1] | Ovr'l | 90% | Ovr'l | 90% | Ovr'l | 90% | Ovr'l | 90% |
| Group I | 70–83 | 72–81 | 1.0–2.0 | same | 82.8–84.4 | 83.2–84.0 | 520–620 | 590–620 | 9.50–10.60 | 10.0–10.5 |
| Group II | 75–79 | 75–78 | 1.5–4.0 | same | 83.6–84.8 | same | 580–610 | 590–610 | 9.40–10.40 | same |
| Group III | 73–84 | 73.5–81.5 | 2.5–5.0 | 3–4.5 | 83.2–86 | 83.6–84.4 | 520–600 | 550–600 | 8.80–10.70 | 9.00–10.60 |
| Group IV | 70–76 | 71–76 | 3.5–4.5 | same | 84–85.2 | same | 580–610 | same | 8.50–10.2 | 8.5–9.2 |

[1] This means that 90% of samples gave values within this range.
[2] Reported on a dirt and water-free basis.

* Ed. Note: The absence of close specifications for different commercial grades has been a definite handicap in the industry, and the possibility of adulteration in Brazil, where it is produced, has concerned importers and users (CI, July 1949, p. 30-31).

# HYDROCHLORIC ACID



## *puts corrosion to work*

The corrosive properties of hydrochloric acid are actually a boon to modern industry. HCl is widely used for treatment of oil wells to open rock formations, and for descaling of industrial heat exchange equipment. It also serves in the pickling and cleaning of metal products. Hydrochloric acid is used as an intermediate in the manufacture of ethyl chloride, essential to anti-knock fluid for gasoline.

America's stake in Dow hydrochloric acid is a big one! The above barge is one of several, each about 225 thousand gallon capacity, used to transport this acid from Dow's Freeport, Texas plant up the Mississippi and Ohio Rivers to Cincinnati, Ohio.

Look to Dow to satisfy your acid needs. For further information and technical assistance write us at Midland.

*DOW ALSO PRODUCES over 600 chemicals including: caustic soda, phenol, aniline, monochlorobenzene, propylene oxide, epsom salt, ethylene oxide, and other basic, industrial, pharmaceutical and agricultural chemicals.*

DOW

CHEMICALS

INDISPENSABLE TO INDUSTRY AND AGRICULTURE

**THE DOW CHEMICAL COMPANY**

MIDLAND, MICHIGAN

SENSE IN RESEARCH
Pays
DOLLARS IN DIVIDENDS!

*At Your Service*

A professional-scientific organization with 10 floors of laboratories, highly skilled in all the ramifications of research. This is coordinated with the keen, practical, commercial perspective.

WE ARE READY

to immediately function as Your Research Laboratory if you have none; Or—to harmoniously complement your present one.

OBVIOUSLY

an unbiased, qualified group already adept and experienced in problems such as yours—product improvement and initiation, processing and marketing — is so much more economical. And — you can hire and fire at will; equipment and personnel investment eliminated.

ACCELERATION

The cumulative experience assures a quick start, and frequently an early solution. It costs you nothing to investigate. Tell us your desires, let us estimate; no obligation.

FOSTER D. SNELL, INC.

Chemists Engineers

*Research Laboratories*

29 W. 15th St., New York 11

WA 4-8800

*P. S.*

*Have you read our brochure "The Chemical Consultant and Your Business"? It's yours for the asking.*



dirt interfered with emulsifying ability, samples were filtered before test.

### INTERPRETATION OF RESULTS

A summary of results according to groups is given in the accompanying table. Actually Group I with 19 samples, representing the yellows, and Group III with 25 samples, representing the darker waxes, are the two most important classes.

*Dirt and moisture.* Dirt values for all samples ranged from negligible to 6.5%. The yellows were most free from dirt, containing up to 1%. Various methods of accurately determining moisture content are still under study.

*Saponification values.* This is a valuable test for characterization purposes. All carnauba samples tested had a saponification range of 70-84. The values as reported here are slightly lower than those usually given in trade literature, for reasons given below.

*Acid numbers.* Similar comments hold for acid numbers. For example, the maximum acid number of carnauba was 5.0. An interesting fact is that acid numbers of yellow waxes are much lower than darker or more mature waxes. This would indicate that chemical changes in maturing, such as oxidation and degradation, give increased amounts of wax acid. Again, values obtained in this study by the new method using a masked indicator are lower than those generally quoted, which are obtained by using phenolphthalein indicator alone.

For this reason, saponification values and acid values obtained in this study were checked by running titrations by means of a Beckman pH meter, which eliminates the need for an indicator at the end-point. The instrument showed that in both acid and saponification determinations, a marked buffering effect was obtained at the end-point. In the case of running acid numbers in the usual way (unmasked indicator), it was evident that if the first delicate color change of phenolphthalein in the wax solution was not noted by an operator (often difficult because of the color of the wax) the end-point would be far overshot in achieving a definite color. As long as the individual operator consistently called a certain color shade the end-point, fairly reproducible values could be achieved by him. This would not necessarily be the same end-point as viewed by another operator, and may be the reason for the frequent divergence of reported values.

Similarly it was noted that there was a marked buffering effect at the end-point of a saponification determination. Thus an operator using unmasked phenolphthalein in a colored wax solution could easily mistake the end-point and obtain a higher value.

In confirming the new technique of using a masked indicator, both acid and saponification values so obtained were closely checked by values from titrations using a pH meter.

*Melting points.* These constitute a good characterization test for the waxes. The test is simply and quickly run, and accurately reproducible.

*Iodine numbers.* There is not enough of a variation in these values for them to be used as conclusive classification tests.

*Flash points.* These varied considerably and cannot be used as a characterization test. Particular attention was paid to flash points as related to emulsification.

*Emulsification.* Quality of emulsions was judged by surface gloss, particle size and flow characteristics. Shelf life so far has been satisfactory.

The 56 samples were tested for emulsification ability. Seven with flash points *under* 570° F. yielded good emulsions; only 3 under 570° F. gave a poor emulsion. On the other hand, 15 samples with flash points *over* 570° F. gave fair or poor emulsions, while 31 with flash points above 570° F. gave good emulsions. Since the ratio of good to poor emulsions for both groups is about the same, it would appear that flash point cannot be used as a criterion for emulsification ability, as tested by the Carbide and Carbon formula. (No changes, however, were made in the emulsification formula to adjust for differences in the carnauba wax itself. Without doubt, such formula changes can improve emulsification properties.) Furthermore, the possibility of obtaining any correlation between emulsification ability and test values obtained was explored. No such correlation was found.

### FURTHER WORK NEEDED

It should be emphasized that while no one test is conclusive in defining a wax sample, a careful determination of two or three of the constants discussed in this article should serve to characterize the wax. It should also be pointed out again that these test values were obtained on this group of 56 samples submitted in 1949, most of which were sent for this purpose by the leading Brazilian wax exporters.

Fruitful paths for further research would appear to be a careful study to determine the effect of variables upon emulsification, and the development of sensitive tests (other than those mentioned in this article) for the detection of various possible adulterants.

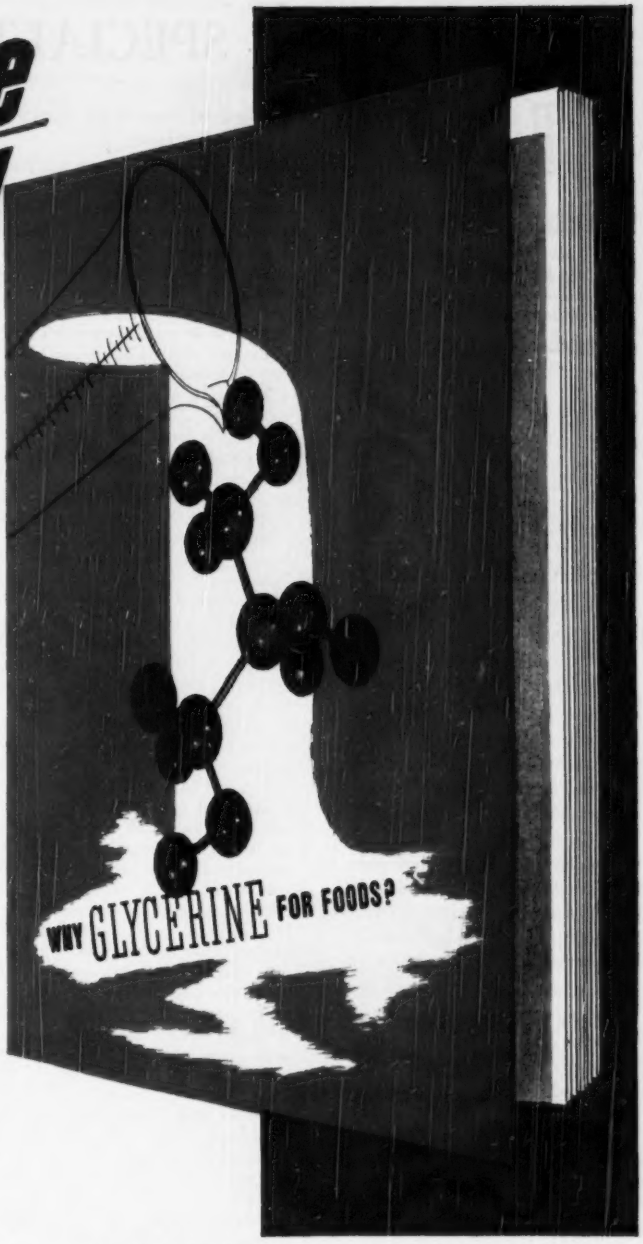
# First Time Offered!

**a practical review of GLYCERINE applications in Foods—**

WHERE? . . . How? . . . Why? . . . If you're looking for the answers to these questions on glycerine usage in food processing—here's the most up-to-date information available!

"Why Glycerine for Foods?" has been reviewed by a number of technical consultants as well as the Research Laboratories of the Glycerine Producers' Association. Contains detailed information by charts and tables of the physical properties of glycerine—the origin, development, and chemistry of this amazingly useful alcohol—grades and their applications. 16 pages of practical, useful data!

Whether you now use glycerine or just wonder about its possibilities . . . whether you're in management, production, or research . . . an expert on glycerine, or thoroughly unfamiliar with the subject—you'll want this informative booklet. Write for your free copy—today! *Address: Dept. 3, Glycerine Producers' Association, 295 Madison Avenue, New York 17, New York.*




*One of a series of five booklets on the industrial applications of glycerine. Also available on request: Why Glycerine? (a general survey of all main uses) . . . Why Glycerine for Alkyd Resins and Ester Gums? . . . Why Glycerine for Drugs and Cosmetics? . . . Why Glycerine for Textiles?*

**GLYCERINE PRODUCERS' ASSOCIATION**

**295 Madison Avenue, New York 17, N. Y.**

# AT LAST

## Lithium Metal Wire In *Coated* Form

## METALLOY SCORES ANOTHER FIRST!

Now, Lithium metal wire is available in convenient, coated form. Immediately upon being extruded, the wire is coated with petrolatum jelly. This protects every inch at all times from the atmosphere.

To use it, merely remove the coating with ordinary hydrocarbon solvents. This coated form is handier than the oil immersion form and affords more positive protection.

At the request of users in the industry, we also make Lithium metal available in the form of lump, rod, shot and cups.

If you are engaged in organic research and have not yet received your copy of *Annotated Bibliography on the use of Organolithium Compounds in Organic Synthesis*, write today.

*Data sheets available from department A.*

LITHIUM METAL
LITHIUM AMIDE LITHIUM HYDRIDE

**METALLOY CORPORATION**
GAND TOWER MINNEAPOLIS, MINN.
Division LITHIUM CORPORATION OF AMERICA, INC.


# SPECIALTIES NEWS

### *Proposed New Wax Specs Under Revision*

Some of the provisions in Federal Bureau of Supply Specification 784a for water emulsion floor wax—the proposed revision of Specification 784 under which the Government now buys such floor wax—were deleted following industry objections at a public hearing. Other performance tests to replace those stricken out are being developed by companies in cooperation with the Bureau, and probably will be included in the specification that is adopted. It is uncertain when this will be.

Both the floor wax industry and the government have been concerned over poor lots of wax that have been sold to the Government under the old specification. Legitimate manufacturers generally favor a tightening of specifications to make it more difficult for floor waxes that give poor performance in actual use to slip by on the basis of low price achieved through use of inferior ingredients. However, it was felt that the proposed revision had many flaws.

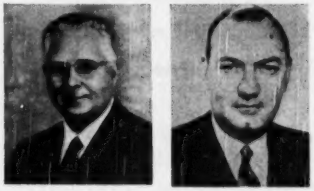
Many of the industry's objections were based on claims that tests were not reproducible, did not measure what they were designed to measure, and could not be met even by a good floor wax. Those who do not bid on Federal business are as concerned as those who do, for it is anticipated that states and municipalities as well as institutions and other large purchasers may use any new specification as a basis for their purchases.

Moreover, there is the fear that the Federal Trade Commission, which is seeking to set up floor wax trade practices, may use any such specification as a source of definitions even though it has no connection with the Federal Bureau of Supply. This agency has objected to such claims "non-slip," "heavy duty," and "waterproof" as applied to floor waxes "unless in fact they are," and there has been much controversy over what these terms mean and how they are measured. Hence, the industry wants to make sure that the new specification is one that a good wax can pass, and not an unworkable one that may haunt it in some future FTC Regulation.

### *Pharmacopoeia to Include Pest Control Chemicals*

Dimethyl phthalate solution and DDT will be included in the 14th Edition of the U. S. Pharmacopoeia despite the protests of the agricultural chemicals industry through its trade organizations. The effective date of the pest control monographs, however, has been postponed for one year after the new edition becomes official.

It is expected that including these materials in the Pharmacopoeia means that they must be labeled and marketed in accordance with laws governing drugs. The National Agricultural Chemicals Association feels that this will work an undue hardship on the industry, and may reduce the availability of these products to growers. This association is studying this proposal which involves many technical and legal problems for which there is no definite legal precedent.



***Ernest Hart (left), elected to the board of directors of Food Machinery and Chemical Corp.; and J. Albert Woods, elected to the board of directors of Commercial Solvents Corp. Mr. Hart is vice-president of his company. Mr. Woods is president of Wilson & Toomer Fertilizer Co., Jacksonville, Fla.***

### *Joint Company to Produce German Insecticides*

Geary Chemical Corp. and Pittsburgh Coke and Chemical Co. will form a jointly owned subsidiary company to produce and market certain new insecticides developed by the German chemical company Farbenfabriken Bayer.

These insecticides are to be made available for manufacture and distribution in this country under the terms of a contract between Bayer and the Geary Chemical Corp. and approved both by the American and British occupation authorities in Western Germany. The agreement with Bayer provides that Bayer will make available to Geary Chemical scientific and manufacturing discoveries, both current and future, in the agricultural chemical field as developed in the Bayer laboratories at Leverkusen and Elberfeld, Western Germany. The joint subsidiary to be formed by Pittsburgh Coke and Chemical and Geary Chemical will be licensed by the latter to manufacture and market certain of these developments.

Extension of Geary Chemical Corp.'s agreement with Bayer to cover other agricultural products such as fungicides, rodenticides and plant hormones, as well as insecticides, is provided for, as is the

## DRYMET*

**THE ECONOMICAL DETERGENT SILICATE**

Cowles DRYMET, anhydrous sodium metasilicate, is the most highly concentrated form of sodium metasilicate available. It is more economical to use, on the basis of both $Na_2O$ (alkalinity) and $SiO_2$ (silicate) than any other type of hydrated or anhydrous detergent silicate, either compounded or by itself. DRYMET contains no water of crystallization.

## DRYSEQ*

**THE ALL-PURPOSE DETERGENT SILICATE**

Cowles DRYSEQ, anhydrous sodium sesquisilicate, is a medium pH alkaline cleaner which will do fast, dependable work at a low cost to the user. It is a white, free-flowing powder, quickly and completely soluble in hot or cold water—containing 56.75% $Na_2O$—making it an economical base material for compounding.

# Cowles CHEMICALS

## DRYORTH*

**THE HEAVY-DUTY DETERGENT SILICATE**

Cowles DRYORTH, anhydrous sodium orthosilicate, is a powerful, speedy, heavy-duty cleaner with valuable penetrating and wetting-out properties, reinforced dirt-removing power and unusual emulsifying action. It is an anhydrous, free-flowing powdered silicate containing not less than 60% $Na_2O$, which may also be used as an economical constituent of high pH cleaning compounds.

## CRYSTAMET*

**THE MEDIUM pH DETERGENT SILICATE**

Cowles CRYSTAMET is a pure, perfectly white, free-flowing granular pentahydrate sodium metasilicate with the normal 42% water of crystallization. Suggested for compounding when it is desirable to lower the concentration of a finished product. Readily soluble—chemically stable—easy to handle. Can be used on medium pH jobs.

★ PROMPT SHIPMENTS FROM CONVENIENT WAREHOUSE STOCKS . . .

*We'll be glad to send you our DRYMET File Folder containing complete technical information and suggested formulations.*

*REG. U. S. PAT. OFF.

**COWLES CHEMICAL COMPANY**

HEAVY CHEMICALS DEPARTMENT • CLEVELAND 3, OHIO

FINE
Balkan
HIGH PURITY
CALCINED MAGNESITE

The high purity, imported Balkan magnesite you've been looking for in vain for nearly a decade is now available here, in finenesses to meet all specifications.

Also furnished in lump form.

Write for Data Bulletin giving physical characteristics and prices. Also working samples.

GENERAL MAGNESITE & MAGNESIA CO.
Specialists in Magnesia
*Manufacturers — Importers Distributors*
Box 671 Norristown, Pa.



exchange of related technical and scientific information.

Products licensed to the new joint subsidiary under the terms of the agreement between the two corporations will be marketed, initially at least, both by the Pittsburgh Agricultural Chemical Co. and the Geary Chemical Corp. itself.

### *Fluid Chemical Becomes Aerosol Filler*

Fluid Chemical Co., Inc., Newark, N. J., for over 20 years in contract packaging of liquid products, is now entering the aerosol packaging field. Physical facilities include a recently purchased 50' x 350' building with a nine car railroad siding. The building is divided into three large bays, one bay to be used for storage and chemical handling, one bay for packaging, and one bay for finished goods storage and shipping.

Production facilities are being set up to handle over 40,000 packages per shift, with production scheduled for this month. Its versatile equipment is designed to handle various Continental aerosol cans, various size Crown cans and also the new Sun Tube aluminum can. Particular emphasis has been placed on quick change-over on product and cans to eliminate the customary loss of production time. Products to be filled include insecticides, deodorants, paints, lacquers, shampoos, moth proofers, fire extinguishers, cosmetics, etc.

### *No-Rinse Trend Grows*

Full-page ads recommending the use of Procter & Gamble's Tide for washing clothes without rinsing have recently appeared in the metropolitan New York area, where housewives are being urged to save water because of a current shortage. It is claimed that the average housewife can save forty gallons of water every washday, and still get a clean wash if she uses Tide and wrings clothes without rinsing.

Lever Bros.' new product, No-Rinse Surf (*CI, Jan. 1950, p. 76*), has not yet been introduced in this water-short area. This detergent is claimed by the company to be a new formula representing an improvement over Surf, for which it did not make no-rinse claims. P&G, however, made no mention of an improved Tide in its advertising.

### *Coast Bleach Plant Nears Completion*

The Tacoma, Wash., plant of Purex Corp., now nearing completion in the Tide flats industrial quadrangle of that city, will be the most modern sodium hypochlorite manufacturing plant in the nation, according to *Progress*, official publication of the Tacoma Chamber of Commerce. It is expected to go into operation this month.

Built on a five-acre site, the new plant is constructed of reinforced concrete, occupies 22,600 square feet of floor space. Construction Engineers & Contractors of Tacoma handled the general contract.

In addition to producing Purex bleach for the Pacific Northwest, the Tacoma division of Purex Corp. is also sales headquarters for other Purex products, which include Trend household detergent, Purex bowl cleaner and Purex drain opener.

### *Minnesota Mining Plans $3-Million Building*

Minnesota Mining & Manufacturing Co. plans to build a $3-million office building in St. Paul as part of its nationwide expansion program. The firm now has under construction in the same city a two-story block-long manufacturing plant scheduled for completion in the fall and costing over $2 million. Work is expected to start on the new structure in 60 days; the firm hopes it will be ready for partial occupancy by the first of next year, with completion in the summer of 1951 held likely.

The building will have five floors and basement, although design calls for seven floors, two of which can be added when necessary. Plans were drawn by 3M engineers and Ellerbe & Co., St. Paul architects and engineers. General contractors will be William Murphy & Son, also of St. Paul.

### *Abbott Laboratories Starts Large Chicago Addition*

Ground has been broken for a $1.8 million addition to one of the large manufacturing buildings at Abbott Laboratories, North Chicago, Ill. It will consist of five floors and a basement constructed of reinforced concrete and masonry, and will add 270,000 square feet of floor space to production facilities.

The addition, 180 feet wide and 236 feet long, will be used principally for a warehouse and for making bulk intravenous solutions. A unique feature will be escalators to carry employees between floors. Work is expected to be completed in one year.

### *Cowles Chemical Opens New Research Lab*

Cowles Chemical Co., Cleveland, Ohio, has moved its research and development laboratory from the campus of Syracuse University to greatly enlarged quarters at 105 S. Townsend St. in downtown

# Black Magic?

## *Almost!*

### . . . the way *Pittsburgh* Granular Activated Carbon meets Adsorbent Problems

The strange adsorptive power and almost unbelievable selectivity and capacity make *Pittsburgh* Granular Activated Carbon ideal for gas and liquid phase adsorbent applications. Its uses include solvent recovery, air and water conditioning, catalysis, catalyst support, chemical purification and antibiotic isolation. Chemically stable and readily regenerated, it has high density and good abrasion resistance. Activity characteristics are carefully controlled for specific application. It is economically produced from selected raw materials as part of integrated Pittsburgh Coke & Chemical Company operations.

This granular carbon is offered in 10 basic grades and in sizes from 4 to 30 mesh (finer sizes for special cases). A complete line of pulverized activated carbon is also available.

Whatever use of an adsorbent is indicated, in refining, manufacturing or processing, *Pittsburgh* Activated Carbon may offer advantages of economy and efficiency. Your inquiries are invited.

*Activated Carbon Division*

PITTSBURGH COKE & CHEMICAL COMPANY

1952 Grant Building, Pittsburgh 19, Pa.

OFFICES: New York San Francisco Tulsa Houston

**Pittsburgh Activated Carbon Solves Process Water Problem!**

An unknown contaminant activated by oxidation time in polymerization kettles at a large plastics plant, *Pittsburgh* Granular Activated Carbon, installed in a specially designed filter, brought the variable under control. Steam regeneration keeps carbon active for continued use.

COAL CHEMICALS · ACTIVATED CARBON · NEVILLE COKE · EMERALD COAL · PIG IRON · GREEN BAG CEMENT · CONCRETE PIPE AND PRODUCTS

Syracuse, N. Y. It is staffed by twenty chemists and engineers under the direction of C. W. MacMullen.

Research projects at Syracuse include development of heavy chemicals in the silicate field, laundry products, metal cleaners, detergents and bactericides for the food processing industries, organic research and the engineering of new processes for the company's plants.

### *Disinfectant Bulletin*

The Chemical Division of Koppers Co., Inc., has issued a new 14-page technical bulletin describing uses of mono-tert-butyl-meta-cresol (MBMC) in formulating germicides and disinfectants for external application to humans and animals, and for household use.

A light-colored liquid alkylated phenol which solidifies slightly below room temperature, MBMC is in a disinfecting agent of high initial potency, which may be greatly increased in disinfectant formulations by a potentiating agent such as methylnapthalene. Investigation by Koppers has shown that it is possible to develop stable commercially-satisfactory disinfectants with MBMC using either water-soluble or water-insoluble blending agents and emulsifying agents.

Included in the technical bulletin are representative formulations for germicides and disinfectants, together with the directions for their preparation, a description of their physical properties, and a tabulation of their phenol coefficients. The company will send copies of Technical Bulletin No. C-9-130-1 upon request to them at Pittsburgh 19, Pa.


# ISCO OPERATION News

**FEBRUARY, 1950**

## ISCO LOCUST BEAN GUM

**A high quality, high viscosity Locust Bean Gum, specially milled for the dairy and food industry. Isco Locust Bean Gum is more efficient because of the uniformity of its grindings. Has remarkable colloidal adhesive and protective properties. Swelling power three to twenty times that of usual gums or starches. Different millings available.**

***Write for samples and complete information, or call CO. 7-5803***

## WAXES

*Bayberry*

*Beeswax*, White, Sun-Bleached—Refined. Yellow.

*Beeswax Substitute*—Light and Medium.

*Candelilla*—Crude and Refined. Lump, Flake, Powdered.

*Carnauba*—No. 1 Yellow, No. 2 Yellow, No. 3, N. C., No. 3 Chalky—Refined in the Flake, Lump and Powdered. Bags, 150-200 lbs.

*Ceresine*—Orange, Yellow, White. All melting points. Bags, 110 and 200 lbs.

*Esparto*

*Japan Wax Imported*

*Japan Wax Substitute*, No. 525.

*Montan-Bohemia Brand and Domestic*

*Montan Wax Substitutes*, Powdered—Lump and Bleached.

*Molding Wax* for Electrotypers.

*Ouricury*—Domestic—Refined. Bags, 150 lbs.

*Ozokerite*—Domestic—White and Yellow. All melting points.

*Palm*—Varying Grades.

*Spermaceti*

*Wax Substitutes*—All Types.

INNIS, SPEIDEN & CO. ISCO

117 LIBERTY ST., NEW YORK 6

BOSTON CHICAGO · CLEVELAND CINCINNATI · GLOVERSVILLE PHILADELPHIA

SUBSIDIARY E. S. BROWNING CO., INC. SAN FRANCISCO • LOS ANGELES


### *Ammoniated Toothpaste Formula*

Considerable interest has been shown in formulations of the popular ammoniated toothpastes, and there has recently been made public a formula which L. A. Kramer, Technical Service Department, Victor Chemical Works, Chicago, suggests as a good starting point for manufacturers interested in such products:

| | | |
|---|---|---|
| Tricalcium phosphate (Victor) | 26.67 | per cent |
| Glycerine | 45.40 | " " |
| Water | 15.40 | " " |
| Flavoring (peppermint) | 0.58 | " " |
| Gum tragacanth | 0.96 | " " |
| Saccharin | 0.10 | " " |
| Surface active agent (Nacconol LAL) | 2.89 | " " |
| Diammonium phosphate, Powd. FF. | 5.00 | " " |
| Urea, 100-mesh | 3.00 | " " |

Allow the gum to expand in water at room temperature for 30 minutes, add glycerine and mix well. Slowly add tricalcium phosphate to this solution and mix thoroughly. Mix in remaining materials in following order: saccharin, flavoring, diammonium phosphate, urea and surface active agent. After adding the surface active agent, mix no longer than necessary to obtain complete distribution.

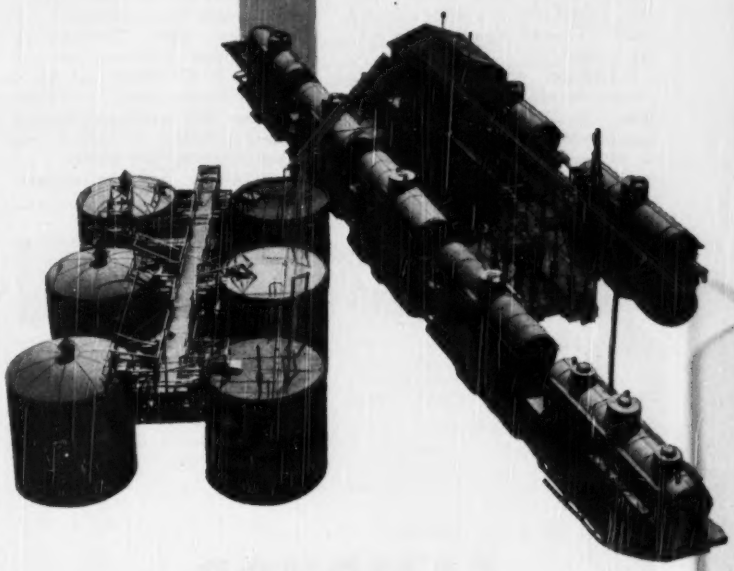
(It should be remembered that all such products are sold under license from the University of Illinois, and formulas of the above type should not be marketed without suitable patent arrangements.)

### *Agricultural Research with Radiophosphorus in 1949*

Sixteen agricultural experiment stations located in 14 states used Atomic Energy Commission-produced radioactive phosphorus in fertilizer "tracer" research during 1949. Experiments begun in 1948 to determine whether low-level radio-activity has any beneficial effect upon plant growth or quality were continued. Tests confirmed results of 1948 which indicated that low-level radioactive materials did not show any beneficial effect upon either crop growth or quality, and that the farmer should not expect increased yields from money invested in radioactive materials.

Other examples of research results obtained with radioactive phosphorus are the following:

It was shown that efficiency of rock



- Dimethyl Phthalate
- Diethyl Phthalate
- Dibutyl Phthalate
- Di-(2 Ethyl Butyl) Phthalate
- Dioctyl Phthalate (DOP)
- Di-(Methoxy Ethyl) Phthalate
- Triacetin
- Tributyrin

EASTMAN
INDUSTRIAL
CHEMICALS

- *FOR LOW COLOR*
- *FOR STABILITY*
- *FOR DEPENDABLE PERFORMANCE*

# Eastman Plasticizers

We will be pleased to send you copies of our bulletin, "PLASTICIZERS," containing specifications, properties, and typical uses of all EASTMAN Plasticizers.

**TENNESSEE EASTMAN CORPORATION**
Subsidiary of Eastman Kodak Company
**KINGSPORT, TENNESSEE**

SALES REPRESENTATIVES: New York—10 E. 40 St.; Cleveland—Terminal Tower Bldg.; Chicago—360 N. Michigan Ave. West Coast: Wilson & Geo. Meyer & Co., San Francisco—333 Montgomery St.; Los Angeles—4800 District Blvd.; Portland—520 S.W. Sixth Ave.; Seattle—1020 Fourth Ave., So.

phosphate as a source of phosphorus depends on the acidity of soil in which it is used.

How much of applied phosphatic fertilizer will be used by a corn crop depends on the other fertilizer plant foods applied even on a fertile soil which yielded 84 bushels of corn per acre without fertilizer.

Experiments demonstrated that increasing the phosphoric acid in fertilizer from 0 to 20, 40, and 60 pounds per acre increased percentage of phosphorus in the cotton plant derived from the fertilizer.

### *Special Glass Coatings Find Widening Uses*

Chemical coatings developed during the war to produce glareless glass and transparent mirrors are now being used in products ranging from radar equipment to telescopic gun sights. Techniques for controlling light reflections were developed by E. D. Tillyer and H. R. Moulton of American Optical Co., Southbridge, Mass., and certain manufacturers have been licensed to use these to produce the coatings for their products.

"Beam splitters" for radar equipment are being made by coating a piece of clear glass with solutions that increase reflections. The glass is thus transformed into a highly efficient semi-reflector capable of transmitting one image and reflecting another.

Coatings that reduce light reflections are being applied to telescopic rifle sights to increase the transmission of visible light and to eliminate annoying internal reflections.

Lenses of spotting telescopes and slide projectors are receiving similar coatings and television tubes are being experimentally coated to cut down reflections from external light on the face of the tube.

Now in production is a small projection unit in which the viewing screen is only a foot or two away from the observer. To do this the light path of the projector is "folded" to make it more compact. Reflection reduction coatings remove "ghost" images from the mirrors of the system and make its operation practical.

### *Increase in Chemical Sales To Feed Industry*

The chemical and drug industry in Chicago is broadening out into the animal feed industry, according to a year-end report made by Jos. V. Sterba, president of Savoy Drug & Chemical Co. Many of the mineral components necessary for balanced feed are now being mixed and supplied by Savoy to feed producers: phosphorus, calcium, magnesium, iron, iodine, sodium, manganese, zinc, copper, cobalt, sulfates and chlorides. About nine per cent of Savoy's total production—a rise from five per cent in the year previous—is now going to animal feed producers as basic mineral and vitamin components for mixtures.

Three reasons were cited for this new trend in the feed manufacturing industry: (1) need for increased and also exact fortifications of feeds, (2) many feed producers do not usually have facilities or know-how for blending drugs and chemicals, and (3) because chemical producers normally buy drugs in large volume for several customers, feed manufacturers have thus been able to procure their vitamin and mineral components, all mixed in exact dosages, cheaper than if they had gone into the drug market themselves.

### *Company Notes*

• **The DuBois Co.**, Cincinnati, Ohio, manufacturers of chemical cleaning and processing compounds, has purchased Giant Products Co. of Los Angeles for approximately $500,000.

The 15-year-old Giant Co., whose

# *commercially pure fatty acids...*

**(concentration of 90% or above)**

Today, you don't have to buy a mixture of fatty acids to get the one you really want. Now, you can select a pure Neo-Fat fatty acid, tailor made to fit your exact needs. Armour's new chemical plant utilizes the Armour-developed *fractional distillation process* to separate crude fatty acids into their component acids, with a degree of purity never before possible (concentrations of 90% or above). This means you can now select the specific fatty acid you desire—without taking an equal or greater percentage of other acids which may contribute nothing to your formulation.

If you are interested in a fatty acid tailored to meet your requirements, send us your specifications for prompt quotation on price and delivery.

Take the guess work out of your fatty acid buying . . . always specify Armour Neo-Fats. They're economical because they're tailor made for your use.

### Neo-Fat 7 (Caprylic Acid)

| | |
|---|---|
| Mean Molecular Weight | 145.7 |
| Titer | 13.0°C. |
| Iodine Value (Wijs) | 0.8 |
| Neutralization Value | 385.0 |

Color...Water White Odor...Characteristic

**Typical Composition**

| | |
|---|---|
| Caprylic Acid | 90.0% |
| Caproic Acid | 3.0% |
| Capric Acid | 7.0% |

### Neo-Fat 9 (Capric Acid)

| | |
|---|---|
| Mean Molecular Weight | 173.3 |
| Titer | 30.0°C. |
| Iodine Value (Wijs) | 1.2 |
| Neutralization Value | 323.7 |

Color...White Odor...Characteristic

**Typical Composition**

| | |
|---|---|
| Capric Acid | 90.0% |
| Lauric Acid | 7.0% |
| Caprylic Acid | 3.0% |

### Neo-Fat 11 (Lauric Acid)

| | |
|---|---|
| Mean Molecular Weight | 203.0 |
| Titer | 37.8°C. |
| Iodine Value (Wijs) | 1.0 |
| Neutralization Value | 276.0 |

Color...White Odor...Trace

**Typical Composition**

| | |
|---|---|
| Lauric Acid | 90.0% |
| Myristic Acid | 9.0% |
| Unsaturated Acids | 1.0% |
| Capric Acid | Trace |

### Neo-Fat 13 (Myristic Acid)

| | |
|---|---|
| Mean Molecular Weight | 226.0 |
| Titer | 37.8°C. |
| Iodine Value (Wijs) | 2.0 |
| Neutralization Value | 248.0 |

Color... White Odor... Characteristic

**Typical Composition**

| | |
|---|---|
| Myristic Acid | 90.0% |
| Lauric Acid | 4.0% |
| Palmitic Acid | 4.0% |
| Unsaturated Acids | 2.0% |

### Neo-Fat 1-56 (Palmitic Acid)

| | |
|---|---|
| Mean Molecular Weight | 258.0 |
| Titer | 56.0°C. |
| Iodine Value (Wijs) | 3.0 |
| Neutralization Value | 216.0 |

Color... White Odor... Trace

**Typical Composition**

| | |
|---|---|
| Palmitic Acid | 90.0% |
| Oleic Acid | 4.0% |
| Stearic Acid | 6.0% |

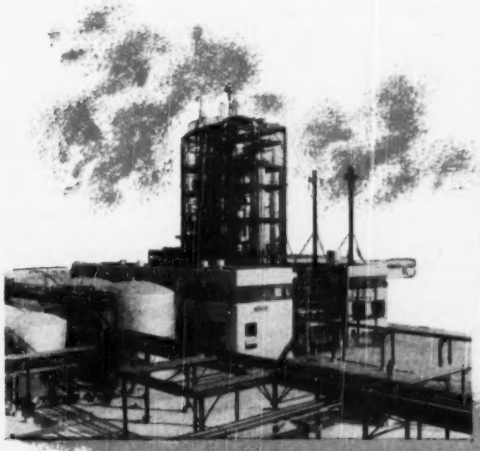
### Neo-Fat 1-65 Stearic Acid

| | |
|---|---|
| Mean Molecular Weight | 282.5 |
| Titer | 67.0°C. |
| Iodine Value (Wijs) | 3.0 |
| Neutralization Value | 198.0 |

Color... White Odor... Trace

**Typical Composition**

| | |
|---|---|
| Stearic Acid | 90.0% |
| Palmitic Acid | 6.0% |
| Oleic Acid | 4.0% |



Fatty acids are discussed in a series of technical booklets entitled, "The Chemistry of Fatty Acids," "The Selection and Use of Fatty Acids" and "The Handling, Sampling and Testing of Fatty Acids."

This literature and other technical information is free upon request.

**Write today** (on your business letterhead, please) for this literature and other technical information . . . free upon request.

ARMOUR *Chemical Division*

Armour and Company • 1355 W. 31st Street, Chicago 9, Illinois • 120 Broadway, New York 5, New York

*from* DYE TO DIE

**VICTOR FORMIC ACID is preferred**

Victor formic acid is applied to a wide range of products and processes. A few of these applications and other information are listed below. Upon investigation you may find that Victor formic acid can advantageously be applied to your product or process. We will be pleased to receive your inquiry and work with you.

**USES OF VICTOR FORMIC ACID:**

- ACIDIFYING DYE-BATHS
- TANNING
- SOURING IN LAUNDRIES
- PLATING BATHS
- COAGULATION OF LATEX
- WIRE STRIPPING COMPOUNDS
- MANUFACTURING FORMATES, FUMIGANTS, PHARMACEUTICALS, ALLERGY DRUGS, SOLVENTS FOR PERFUMES, LACQUERS

Victor formic acid is a colorless, corrosive liquid which evaporates completely on exposure to the air and has a characteristic pungent, penetrating odor. While milder than the ordinary mineral acids, it is the most active, volatile organic acid. It is available in concentrations of 85% and 90% and shipped in 13 gal. glass carboys (130 lbs. net) and 55 gal. stainless steel drums (550 lbs. net).

VICTOR CHEMICAL WORKS ®

***Write for Technical Data and Experimental Samples***

**VICTOR CHEMICAL WORKS**

**141 West Jackson Boulevard** **Chicago 4, Illinois**


***CHEMICAL SPECIALTIES——***

products generally parallel those of DuBois, will provide a branch manufacturing plant, laboratories and offices on the West Coast. Giant products have been sold principally in West Coast states, while DuBois maintains field representatives and warehouses in all principal cities.

• **All operations** of Socony Paint Products, Division of Socony-Vacuum Oil Co., Inc., at Metuchen, N. J., are now being transacted in the name of Socony Paint Products Co.

• **Continuing development** of overseas markets for toxaphene insecticides, to help established a year-round basis for what in this country is a seasonal business, will be furthered during the next few months by Hercules Powder Co. Frank U. Rapp, its supervisor of toxaphene sales, has left on his third trip to South America, and Richard J. Both, of the toxaphene sales staff, has left for Africa to investigate potentialities of insect control on crops and live stock on that continent.

• **Administrative officers** and their staffs, numbering approximately 50 people, have moved into the new laboratory building of the Sterling-Winthrop Research Institute at Rensselaer, N. Y. The four-story brick building on a 70-acre site atop Columbia Hill between New York and Albany is virtually completed, and Maurice L. Tainter, Institute's director, is now making plans for a formal dedication in May.

• **Sales of** Minnesota Mining & Manufacturing Co., at the end of the third quarter of 1949 were $83,200,600, an increase of $3,400,000 over the same period for 1948, and are expected to total in 1949 higher than the $108,000,000 record set in 1948. New products introduced and well received during the year included filament tape for shipping and packaging, new ceramic tile adhesive which can save as much as half a ton of weight in tiling a bathroom or kitchen, machine for mass production of pre-recorded reels of magnetic sound tape, mailing-piece sealer designed to use the firm's pressure-sensitive tapes, "Lacelon" plastic ribbon and a simple-to-use autobody sealing compound.

• **Graver Water Conditioning Co.** has appointed Fred S. Renauld & Co. its Los Angeles representative to cover Southern California, Mexico and Lower California, and Russell R. MacDonald Co. as its sales engineering representative in the Richmond, Va., territory, with headquarters at Atlantic Life Building, Richmond 19.

# FORMULATIONS OF VINYL SHEETING STOCKS DEMONSTRATE THE SUPERIOR PERFORMANCE OF

Barrett

## "ELASTEX" 50-B PLASTICIZER AND "ELASTEX" DCHP PLASTICIZER

Typical formulations incorporating either Barrett "ELASTEX" 50-B Plasticizer or Barrett "ELASTEX" DCHP Plasticizer in the preparation of polyvinyl chloride sheeting stocks show the outstanding properties of these stocks in the usual tests of compatibility, permanence and plasticizing efficiency.

**1. COMPATIBILITY.** The high compatibility of "ELASTEX" 50-B Plasticizer permits its use with other less compatible plasticizers thereby effecting reductions in the cost of the compounds.

**2. PERMANENCE.** Use of "ELASTEX" 50-B Plasticizer and "ELASTEX" DCHP Plasticizer improves oil- and water-resistant properties of stocks, even when more easily extractable plasticizers are incorporated in the formulations. Low volatile losses and excellent light stability qualities are also noteworthy when "ELASTEX" DCHP Plasticizer is included in stocks.

**3. PLASTICIZING EFFICIENCY.** Tension data indicate the good efficiency and toughness of stocks in which "ELASTEX" 50-B Plasticizer and "ELASTEX" DCHP Plasticizer were used. The stocks have soft "hand", good "drape" and low brittle temperatures.

For complete information and test data reporting experience with five compounds, send for the pamphlet: *Applications for "ELASTEX" 50-B Plasticizer and "ELASTEX" DCHP Plasticizer in Vinyl Sheeting Stocks.* It will be sent you without cost or obligation.

**THE BARRETT DIVISION**
ALLIED CHEMICAL & DYE CORPORATION
40 RECTOR STREET, NEW YORK 6, N. Y.
In Canada: The Barrett Company, Ltd., 5551 St. Hubert Street, Montreal, Que.

# CELANESE* CP ACETONE

Look to Celanese for CP Acetone—in the quantities you need to meet your industrial requirements. This high quality ketone is supplied in accordance with the following specifications:

| | |
|---|---|
| Acetone Content | 99.5% min. |
| Sp. Gr., 20/20°C. | 0.7915—0.7935 |
| Distillation Range | 1°C. max. incl. 56.1°C. |
| Color | 5 APHA max. |
| Acid as Acetic | .002% max. |
| Alkalinity as $NH_3$ | 1.0 ppm max. |
| Non-Volatile | Max. .001 gr. per 100 cc sample |
| Permanganate Time | 2 hours min. |
| Aldehydes | None |
| Water | Less than 0.5% (miscible with 19 vol. 60° Be' gasoline at 20°C.) |
| Corrosion Test | Pass |
| Mercury Test | Pass |

Celanese offers the advantages of a nationwide distribution system which includes tank truck delivery service in important areas. Write for catalog containing specifications and general information on Acetone as well as other Celanese organic chemicals.

CELANESE CORPORATION OF AMERICA
**Chemical Division, Dept. 52-B**
180 Madison Avenue, New York 16, N. Y.

**GET THESE ORGANIC CHEMICALS FROM CELANESE**

| | |
|---|---|
| **Formaldehyde** | **Propylene Glycol** |
| **Paraformaldehyde** | **Methanol** |
| **Acetaldehyde** | **n-Propyl Alcohol** |
| **Propionaldehyde** | **Butyl Alcohols** |
| **Acetic Acid** | **Tricresyl Phosphate** |
| **Acetone** | **Special Solvents** |

Celanese* CHEMICALS

*Reg. U. S. Pat. Off.

**ACIDS · ALCOHOLS · ALDEHYDES · GLYCOLS · INTERMEDIATES · KETONES · PLASTICIZERS · SOLVENTS**

# NEW CHEMICAL SPECIALTIES

*Note: This section limited to new finished specialties. New raw materials and intermediates of interest to specialties manufacturers are described in New Products and Processes department.*

## *Aerosol Paint*

**Household enamel available in aerosol container.**

A new aerosol push-button spray dispenser, called Super-Eze Screen Enamel, has been developed by Marley Industries Corp., 10-42 47th Road, Long Island City. To be promoted for household screen painting, it releases a spray of enamel by the press of a finger tip. It is available in green and black.

It is also recommended for a variety of household articles which are difficult to paint by brush. A twelve ounce dispenser, said to be sufficient to paint all the window and door screens of an average sized house, retails for $1.69.

## *Automotive Products*

**Windshield washer fluid and penetrating oil added to Nor'way line.**

Nor'way Windshield Washer Fluid and Nor'way Penetrating Oil are the latest additions to Commercial Solvents Corp.'s large line of automotive specialties. The former, for use in automatic windshield washing devices, removes oil, grime, dust and blinding road splash from windshield glass, leaving it crystal clear. It contains anti-freeze solution. The penetrating oil is intended for use on frozen bolts, studs, corroded pipe joints and similar connections whether frozen by rust, paint, red or white lead, varnish, carbon, gum or dirt.

## *Fungicide Wood Sealer*

**Wood protected from moisture and fungi by new sealer.**

To moisture-proof and rot-proof oak flooring and other wood products, Tuf-On #630-F Fungicide Sealer is a new wood preservative developed by Brooklyn Varnish Mfg. Co., Inc., 50 Jay St., Brooklyn, N. Y. Adapted to production line finishing, it dries to touch in a few minutes and acts as an impregnating agent. Penetrating deeply into the fibers of the wood, this sealer reinforces and fungus-proofs at the same time. It may also be used as a finish coat sealer, followed by multiple coats of varnish.

The same company has also developed Tuf-On Filaplast for fiberglas and plastics. It performs the dual function of adhering to fiberglas and plastic surfaces, and of filling indentations whenever they occur on the surface. Based on phenolic resins, Filaplast may be applied by putty-


# Your Problem Today

## may be solved by using

## DU PONT "ELVACET"

REG. U. S. PAT. OFF.

**POLYVINYL ACETATE EMULSION**

Versatile Du Pont "Elvacet" emulsion has already proved to be the solution to many problems in many fields. Perhaps this interesting resin emulsion can lead to a *saving in your operations* . . . an *improvement in your product* . . . or to *development of an entirely new and profitable item*. Why not look into its outstanding possibilities right now?

### "Elvacet" is already being used for:

**ADHESIVE COMPOSITIONS**
**BINDERS**
**GREASE-PROOF COATINGS**
**TEXTILE FINISHES: fabric stiffeners, coatings; laminations; hat sizes.**

**"Elvacet" emulsion contains** colorless, odorless, non-yellowing film-forming resin with excellent aging and light-fastness properties. It is easily applied, requiring no costly or flammable solvents and is uniformly dispersed in water. Furthermore, "Elvacet" emulsion exhibits wide latitude in compounding with starches, dextrin, gums, waxes, many synthetic resins, chlorinated rubber, rubber latex and other common types of extenders, pigments and plasticizers.

***FOR FURTHER INFORMATION*** about "Elvacet" emulsion, help in its use for a specific application, samples, etc., clip the coupon below and send it today to E. I. du Pont de Nemours & Co. (Inc.), Electrochemicals Dept., Wilmington 98, Delaware.

***MAIL TODAY!***

DU PONT
ELECTROCHEMICALS
DU PONT
BETTER THINGS FOR BETTER LIVING
. . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Electrochemicals Dept., Wilmington 98, Del.

Please send me information about "Elvacet" polyvinyl acetate emulsion.

Name_____
Position_____
Firm_____
Address_____

CI-2

# WE'VE DONE IT FOR MAKERS OF PLASTIC....

TODAY, odor plays a role of increasing importance in the broad field of plastics. But well fixed, heat resistant aromatics and practical methods of incorporation had to be developed before this was possible. Now articles made of plastic—raincoats, upholstering materials, ladies' handbags, tobacco pouches, plasticized undergarments and countless other items of every-day use—are bought and enjoyed with never a thought to the unpleasant odor that skillful masking has successfully eliminated. Thus, the modern and versatile plastic gains added sales momentum *—at negligible cost*—through the use of appropriate aromatics. Which suggests the possibility that . . .

# PERHAPS WE CAN DO IT FOR YOU!

Perhaps we can correct certain odor problems afflicting *your* products or your industry. It will obligate you in no way to let us try. And if we do succeed, you will gain as have all others who have seized upon the advantages of odorant, deodorant or neutralizer to render their products more attractive. . . . A letter describing your odor problem in full detail will enable us to reply promptly and—we hope—satisfactorily to your query. Why not write us today?

**FRITZSCHE Brothers, Inc.**

Est. 1871

PORT AUTHORITY BUILDING, 76 NINTH AVENUE, NEW YORK 11, N. Y.

BRANCH OFFICES *and* *STOCKS. *Atlanta, Ga., *Boston, Mass., *Chicago, Ill., Cincinnati, O., Cleveland, O., Dallas, Tex., Detroit, Mich., *Los Angeles, Calif., Philadelphia, Pa., San Francisco, Calif., *St. Louis, Mo., *Toronto, Canada and *Mexico, D. F.
FACTORY: *Clifton, N. J. and Seillans (Var), France.*




knife or squeegee, or may be thinned for spray-application. It sands easily, and dries in several hours. It forms a base coat for enamels and lacquers without lifting on molded fiberglas and plastic products, such as boats, manikins, wardrobe trunks, shower stalls, and one-piece phone booths.

## *Rubber-to-Metal Adhesive*

**Adhesive reacts with metal and rubber, forms chemical bond.**

Kalabond RM-2, a new type rubber-to-metal adhesive developed by the General Tire & Rubber Co., Akron, Ohio, is adaptable for bonding a wide range of metals to different types of rubbers. Based on a tailor-made polymer, it reacts with both metal surface and rubber during vulcanization, forms a positive chemical bond. It will bond natural rubber, GR-S, nitrile rubbers, and neoprene to steel, stainless steel, aluminum, zinc, magnesium, brass, monel, and nickel. Bonds resist aging, solvents and oils, boiling water.

Other features, important in plant production, are uniformity, stability, and ease of handling and application. It contains no halogen, has definite anti-corrosive properties.

## *Lacquer for Plastics*

**Finish for cellulose acetate and cellulose acetate butyrate.**

Dual purpose lacquer, known as Base XC 14, for both cellulose acetate and cellulose acetate butyrate, has been developed by United Lacquer Mfg. Corp., Linden, N. J.

Base XC 14 is available in clear finish or in colors in any desired sheen, and will airdry in a few minutes, thereby increasing production speed. Manufacturers using both types of plastics, may reduce inventories by maintaining stock of one lacquer only. The new finish is expected to overcome previous difficulties, particularly softening of plastics, and give protection as well as increased sales appeal to toys, radio cabinets, clothes hangers, religious articles, etc.

## *Protective Coating*

**Vinyl coating gives metals temporary or permanent protection.**

A removable protective vinyl coating designed to prevent corrosion, scratching or abrasion of metals during production assembly, shipping or storage has been introduced by Specialty Coatings Laboratory, 1721 North Water Street, Milwaukee 2, Wis.

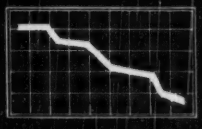
The coating is custom formulated to meet specific end uses such as masking or stop-off lacquers and protective films for polished metals. For the latter application a corrosion inhibitive composition

DOUBLE CHECKED ✓ FROM RESEARCH TO INDUSTRY

# GET

WATER SPOT RESISTANCE

HIGH TEMPERATURE STABILITY



REDUCED COST

BY USING SHARPLES

DIETHYLAMINOETHANOL 246

with fatty acids in your floor wax formulations.

**WATER SPOT RESISTANCE**

Since this amine evaporates with the water from the wax film after application, water spot resistance is extremely high.

**HIGH TEMPERATURE**

Standard floor wax formulations using Diethylaminoethanol 246 do not gel when kept at 125°F. for 168 hours.

**COST**

Amines which produce formulations of equal quality are usually more expensive on either a pound or mol basis.

*For prices and technical information write to Dept. A.*

SHARPLES TRADE MARK CHEMICALS

SHARPLES CHEMICALS INC.

123 SOUTH BROAD ST.
PHILADELPHIA 9, PA.

# Your best source of $NH_3$

**Barrett Standard Anhydrous Ammonia** is America's leading source of $NH_3$. Its dependable quality, consistent purity and uniform dryness have made it the standard for the chemical industry since 1890.

**Barrett Standard Anhydrous Ammonia** is available in two grades:

▶ **Refrigeration Grade, guaranteed minimum 99.95% $NH_3$.**

▶ **Commercial Grade, guaranteed minimum 99.5% $NH_3$.**

**Both grades are shipped** in tank cars with a capacity of approximately 26 tons of $NH_3$. Refrigeration Grade only is also packaged in 150, 100 and 50-pound cylinders. Tank car shipments are made from Hopewell, Virginia, and South Point, Ohio. Loaded cylinders are stocked at points conveniently located from coast to coast.

**Barrett Standard Anhydrous Ammonia** passes rigid tests for moisture, non-condensable gases and other impurities, before release for shipment. Cylinders and tank cars are thoroughly cleaned and inspected, upon return to the plant, before reloading.

**The advice and help** of Barrett technical service men are available to Barrett customers without charge. For information, contact Barrett, *America's leading distributor of ammonia.*

Barrett*

**STANDARD ANHYDROUS AMMONIA**

**THE BARRETT DIVISION**

ALLIED CHEMICAL & DYE CORPORATION

40 RECTOR STREET, NEW YORK 6, N.Y.

*Reg. U. S. Pat. Off.




has been developed to retard under-film corrosion.

Applicable by spray, brush or dip methods, it is available in clear and a variety of colors, both translucent and opaque. A sprayed coating has a coverage of 250 to 300 sq. ft. per gallon per mil thickness. The coating can be peeled off whenever desired, or it can be obtained in a permanently adherent type.

## *Car Polish and Finish*

**Polishing process for synthetic finishes leaves easily maintained surface.**

Plasticlear Cleaner and Polish and Super Hard Finish, products Plasticlear Products, Inc., Malden 48, Mass., developed for aviation industry, are being sold to maintain automobile and other synthetic finishes.

Cleaner and Polish removes old wax and dirt, brings up high lustre. Super Hard Finish is said to bind pigments of paint together, protect high gloss of finish. Thereafter, surface is maintained by adding one ounce of finish to pail of water and swabbing car with solution. Plasticlear can also be used on acrylic plastic parts, prevents clouding of plastic windows.

Cleaner and Polish sells for $1.00 a pint; Super Hard Finish, $1.25; in gallons, they are $5.50 and $6.30, respectively. Sold through automotive distributors and gasoline companies.

## *Odorants for Rubber*

**Series of odorants for rubber and related products now available.**

The Du Pont Co. has marked its formal entry into the industrial aromatics business with a new series of odorants, trade marked "Alamask," for natural and synthetic rubber. They are to be used in foam rubber products such as pillows, mattresses, seat cushions; latex-bonded upholstery and rug-backing fibers to reodorize both rubber and fibers; rubber-containing adhesives; such rubber goods as gloves, girdles, hot-water bottles, etc.; and certain plastics.

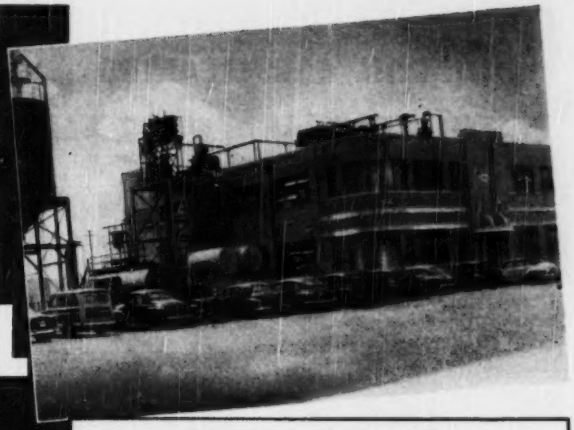
The new line is the outgrowth of a year's research at the Du Pont Aromatics Laboratory, New Brunswick, N. J., supplemented by a testing program in its Rubber Laboratory.

## *Engine Corrosion Inhibitor*

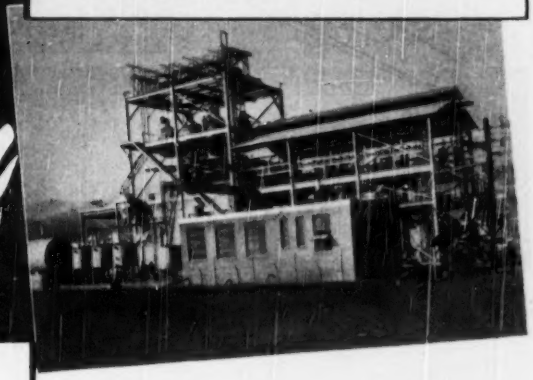
**Chemical prevents corrosion in cooling systems of marine engines.**

The rust preventive called Aqua-Clear, previously marketed by Sudbury Laboratory, Sudbury, Mass., for use in drinking water tanks, was exhibited at the International Motor Boat Show, New York, N.Y., last month in crystal form for use in a filter-like device to prevent

# 2 new FINE CHEMICAL PLANTS now in production



From coal mine and through Tepco Coke Plant and then through these two new modern Fine Chemical Plants, every step of Tepco production is under close control by our laboratories.



**A NEWLY ENLARGED SOURCE FOR**

- **BHC, Tech. 12% Gamma minimum**
- **Sodium Benzoate, USP**
- **Benzoyl Chloride**
- **Benzoic Acid, Tech.**
- **Benzaldehyde, Tech.**
- **Benzyl Alcohol, Tech.**
- **Benzyl Chloride**

*See footnote for additional listing*

TEPCO

**CONTROLLED QUALITY.** Beginning with basic raw materials from company owned mines, every step of manufacture is in company plants. Production under one management, one responsibility, assures controlled quality, more dependable deliveries.

**YOUR OPPORTUNITY.** Let us demonstrate the high purity of our products. Let us show you how the automatic materials handling, automatic controls, step-by-step laboratory checks and complete control from basic raw material to finished product results in dependably uniform high quality.

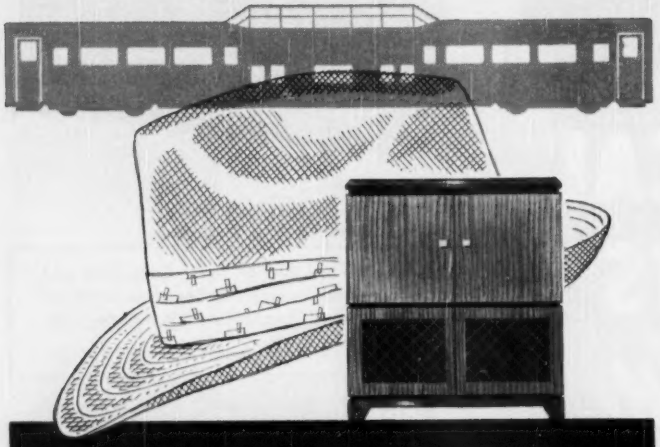
SPECIFICATIONS, SAMPLES and DELIVERY DETAILS on Request.

## TENNESSEE PRODUCTS & CHEMICAL CORPORATION

*OFFICES:* American National Bank Bldg., Nashville 3, Tennessee — 350 Fifth Avenue, New York 1, N. Y.
332 South Michigan Avenue, Chicago 4, Illinois — 4800 Central Ave., Chattanooga 10, Tenn.
*SALES REPRESENTATIVES and Warehouse Stocks in Principal Areas*

**TEPCO CHEMICALS, INTEGRATED PRODUCTION, CONTROLLED QUALITY.** Acetic Acid, Ammonium Sulphate (Sulphate of Ammonia), Benzal Chloride, Benzaldehyde (Tech), Benzene (Benzol), Benzene Hexachloride (BHC), Benzoic Acid, Benzyl Alcohol, Benzotrichloride, Benzoyl Chloride, Benzyl Benzoate (Technical and F. F. C.), Benzyl Chloride, Cinnamic Aldehyde (N. F.), Flotation Oil, Methanol, Methyl Acetone, Muriatic Acid (20°Be), Napthalene (Crude), Smoke Flavor (Meat Packers and Perfumers), Sodium Benzoate (U. S. P.), Solvent Naptha, Oils (Hardwood), Tenn-Creo, Toluene (Toluol), Xylene (Xylol).

from RAIL CAR CLEANING...
TO STRAW AND WOOD BLEACHING



VICTOR OXALIC ACID
is preferred

The versatility and popularity of oxalic acid are indicated by its wide range of uses. Today, Victor oxalic acid is employed in:

- Leather Processing
- Cleaning Railroad Cars
- Radiator Cleaning Compounds
- Laundry Sour, for Neutralizing Alkali, Discharging Bleach, and Removing Iron Stains
- Bleaching Straw, Wood, Cotton Linters
- Removing Rust Stains from Marble
- Purifying Rosin
- Manufacture of Metal Polishes
- Manufacture of Candles, Varnish, Paper, Textiles

Victor oxalic acid is a brilliant, transparent, colorless, crystalline material. It is a strong acid in convenient, dry form. Typical quality: Assay (min.) 99.8%, $(COOH)_2 \cdot 2H_2O$, $SO_3$ (max.) 0.05%. Solubility: 12.5 parts in 100 parts water at 25°C. Available in barrels or fiber drums.

*Write for technical data and experimental sample.*

VICTOR CHEMICAL WORKS

141 West Jackson Boulevard • Chicago 4, Illinois



corrosion in marine engine cooling systems. The filter with the new crystals may be installed between water pump and sea-cock or between water pump and engine. Crystals slowly dissolve, coat water jackets and manifold with a protective film against salt or fresh water, yet coating doesn't interfere with heat transfer from metal water jackets to cooling water.

Rate of consumption of crystals depends on temperature of the water, and rate of flow. It is indicated that about 1 lb. of crystals will be consumed per 10,000 gallons of water pumped. For pleasure boating, cost is estimated at less than $2.50 for a four-month boating season. Price is $2.50 a lb., but less in larger packages.

## *Resin Cement*

**Thermo-setting cement very inert, useful in corrosion-resistant construction.**

The Electro Chemical Supply & Engineering Co., 750 Broad St., Emmaus, Pa., has developed a thermo-setting synthetic resin cement, Lecite, that is inert to solvents, fats, oils, greases, alkalis and acids, except strong chromic, nitric, and sulphuric over 60° Be at temperatures to 375°F. Lecite is particularly useful for jointing acid-proof brick and pipe in constructing neutralizers, disposal units, tanks, process equipment, towers, fume ducts and stacks, floors, etc., where such corrosive materials are factors. It may be stored indefinitely at atmospheric temperatures, is non-toxic, non-flammable, will not foam to form porous mortar and give off toxic fumes, sets quickly to form dense, shiny, shock-resistant joints. Compression strength exceeds 10,000 p.s.i.

## *Penicillin Tablets*

**Soluble penicillin tablet can be administered three ways.**

Tablets of penicillin described as extremely soluble titurates of crystalline penicillin B potassium, without any binder, flavoring agent, or other foreign ingredient, are being offered by Winthrop-Stearns Inc. They are recommended for oral use, sub-lingual administration, and for inhalation in solution by means of a nebulizer. Strengths available are 50,000 to 100,000 units per tablet, packed in bottles of 12.

## *Warble Fly Control*

**Product controls warble fly, cattle pest.**

Improved product for warble fly control has been introduced by Canadian Industries Ltd.'s agricultural chemicals division. Called Warbicide 5, it controls pests responsible for millions of

# 4 good reasons why you should use **D-40 detergent**

FOR WETTING, FOAMING, CLEANING AND COMPOUNDING

**ORONITE CHEMICAL COMPANY**

Reg. U.S. Pat. Off.

*THE NAME TO WATCH IN CHEMICALS*

**D-40's** superior *cleaning action* really gets the dirt, yet D-40 is neutral and will not harm the finest fabrics.

**D-40's** fast *wetting and penetrating* action and its remarkable stability over a wide range of pH conditions have proven helpful in a variety of industrial applications from fruit washing to dye leveling.

**D-40's** abundant *foam* will add "life" to any compound, yet for special purposes, the foam can easily be eliminated.

**D-40** in new whiter color, designed to suit any industrial, compounding or repackaging requirement, is now available in three particle sizes: flakes—granules—powder.

Oronite's Detergent Raw Materials are available in forms to fit the requirements and resources of all possible users. (1) *Alkane*, a clear, water-white alkyl aromatic hydrocarbon. Available to primary manufacturers of quality detergent products as a base stock for sulfonation. (2) *Detergent Slurry*, the sulfonated derivative of Alkane. A paste-like product for use in many cleaning applications or as a base for further compounding and drying. (3) *Dry Detergents D-40 and D-60*, the dry products from Oronite Detergent Slurry.

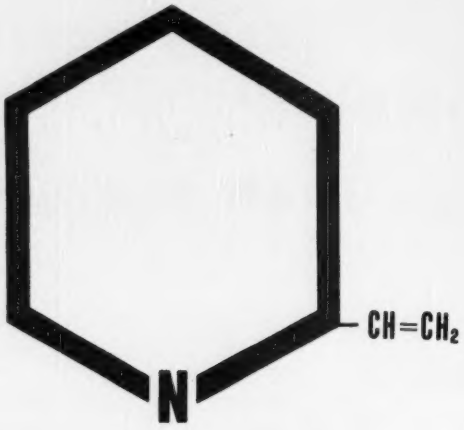
*Ask for complete technical information from your nearest Oronite office.*

**OTHER ORONITE PRODUCTS:**

*Polybutenes • Cresylic Acids*
*Naphthenic Acids*
*Sodium Sulfonates*
*Purified Sulfonate*
*Phthalic Anhydride*
*Gas Odorants*
*Wetting Agents*
*Quaternary Compound ATM-50*
*Ortho, Meta, Para Xylene*
*Xylol • Benzol*
*Lubricating Oil Additives*
*Aliphatic Acid*
*Hydroformer Catalyst*
*Dibutyl Phthalate*

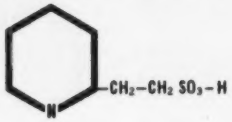
**ORONITE CHEMICAL COMPANY**

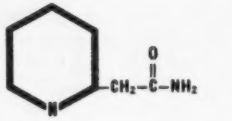
SS SANSOME ST., SAN FRANCISCO 4, CALIF.
STANDARD OIL BLDG., LOS ANGELES 15, CALIF.
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
612 S. MICHIGAN AVENUE, CHICAGO 5, ILL.
924 WHITNEY BLDG., NEW ORLEANS 12, LA.

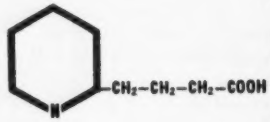


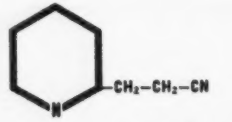

# 2-Vinylpyridine

## a versatile organic chemical




● 2-Vinylpyridine, one of the more important coal tar products developed by Reilly, is a highly versatile organic chemical. Not only is it capable of polymerizing to form a series of unusual polymers, but it is also capable of undergoing a number of interesting reactions.

Illustrated are only a few of the many pyridine compounds that may be synthesized from 2-Vinylpyridine. The chemical activity of this material commends it to all research and production departments interested in either the preparation of polymers or the synthesis of organic chemicals.

Among the uses to which 2-Vinylpyridine has already been put have been the production of plastics and synthetic elastomers. There are also many interesting possibilities in the manufacture of pharmaceuticals, insecticides and fungicides. Manufacturers in any of these fields will find 2-Vinylpyridine well worth their investigation.

Your inquiries on 2-Vinylpyridine, or any other coal tar chemical, are invited, and will have prompt attention.

**REILLY TAR & CHEMICAL CORPORATION**

Merchants Bank Bldg., Indianapolis 4, Ind.

500 Fifth Avenue, New York 18 • 2513 S. Damen Avenue, Chicago 8

*Reilly Coal Tar Chemicals For Industry*




dollars of damage to Canadian cattle hides each year.

Solution made of the powder and warm water is applied to backs of cattle with cloth, sprinkler or brush; is rubbed into cysts with stiff brush to contact developing grubs.

### *Potent Antihistamine*

**Compound said to be more potent antihistamine than those now in use.**

Thenfadil, a new antihistamine compound developed by the Sterling-Winthrop Research Institute, Rensselaer, N. Y., was described to the Cincinnati Section of the American Chemical Society as more potent than such drugs now in common use for allergies and colds. Chemically dimethylaminoethyl 3-thenylamino-pyridine hydrochloride, it has received favorable reports, and when ready for physicians, it will probably be as a prescription specialty for hay fever, asthma and other allergies, and possibly in nose drops.

### *Protective Coating*

**Coating combines rust inhibition and corrosion resistance.**

Protective maintenance coating and production finish combining rust inhibition and corrosion resistance is Kem-Ban, product of Ace Laboratories, Lakewood, O. Based on specially selected copolymer with rubber derivatives as plasticizers, formula provides resistance to acids, alkalies, chemical fumes, moisture, salts and alcohols while imparting rust resistance to surface covered.

Applied by spray dip or brush, it dries in 20-30 minutes. Coating doesn't check, peel, or crack. It adheres to ferrous and non-ferrous metals and alloys, galvanized surfaces, clad metals, polished and stainless steels. Also can be applied to wood, linoleum, composition flooring or used as sealer for plaster, stucco, cement, etc.

Available in clear, brown, black, dark green, white, chrome yellow and tile red. Shipped in 55-gal. drums, 5-gal. cans and 1-gal. cans.

### *Cardamon Oil Replacement*

**Improvement on wartime replacement offered for scarce cardamon oil.**

To fill the gap caused by scarcity of natural cardamon oil, a replacement is being offered by Magnus, Mabee & Reynard, Inc., 16 Debrosses St., New York, N. Y. Known as Card-O-Mar MM&R, it is an improvement of replacement perfected during the war when many imported essential oils were unobtainable, and sells for a fraction of the cost of the natural product. Its use in place of natural oil requires no change in formula, and it is said to be virtually indistinguishable from natural in flavor, strength and other characteristics.

From SHELL CHEMICAL-

# IONOL*

**A tri-substituted hindered phenol of high chemical purity**

## THE ANSWER TO MANY OXIDATION PROBLEMS

### Are you troubled by—

. . . **rubber staining or discoloring?** IONOL guards rubber products against oxidation, *even through long exposure to light, air and heat.*

IONOL is non-discoloring in light-colored rubber goods . . . non-staining to rubber-guarded parts. This highly compatible and effective anti-oxidant can be readily included in the recipes you are now using.

. . . **plastics deterioration?** IONOL *can help* inhibit product changes due to oxidation . . . such as brittleness, loss of texture and discoloration.

. . . **poor "keeping" ability of animal and vegetable oils?** Minute quantities of IONOL can prevent rancidity . . . can maintain normal color and appearance in both oils and prepared esters.

. . . **unreliable anti-skinning properties of paints and inks?** IONOL permits controlled *retardation* of skin formation.

. . . **weakening of botanical insecticides?** Small quantities of IONOL extend the high-potency life of pyrethrum and other important insecticides.

. . . **brake fluid corrosiveness?** IONOL is an effective inhibitor for brake fluids.

**SPECIFICATIONS**

| | |
|---|---|
| Purity (minimum) | 98% |
| Freezing Point (minimum) | 68.5°C |

**% SOLUBILITY OF PURE COMPOUND BY WEIGHT AT 20°C IN:**

| | |
|---|---|
| Absolute ethanol | 26% |
| Isopentane | 50% |
| Benzene | 40% |
| Castor oil | 20% |
| Coconut oil | 29% |

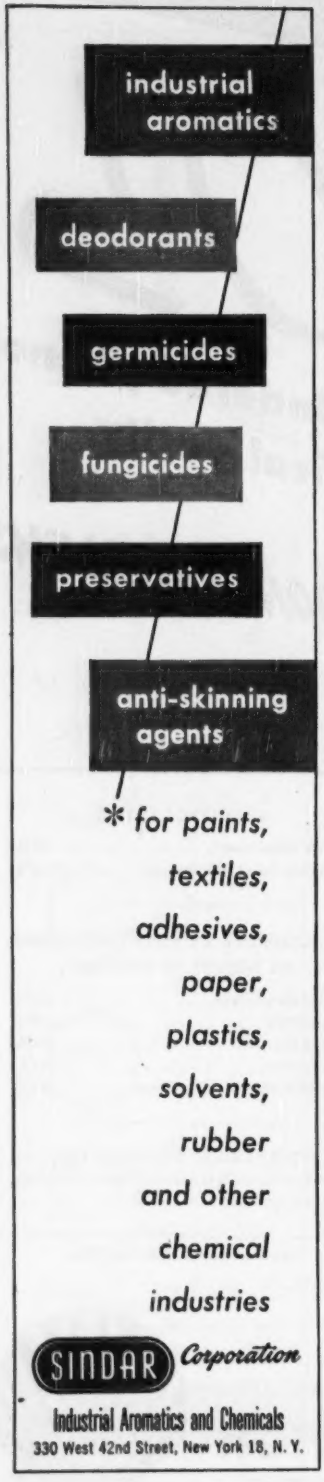
**A LETTERHEAD REQUEST** will bring you further information and a sample of IONOL for your own tests.

*Trade Mark registered, U.S. Patent Office

## SHELL CHEMICAL CORPORATION

Eastern Division: 500 Fifth Avenue, New York 18 • Western Division: 100 Bush Street, San Francisco 6

Los Angeles • Houston • St. Louis • Chicago • Cleveland • Boston • Detroit • Newark




* for paints, textiles, adhesives, paper, plastics, solvents, rubber and other chemical industries

SINDAR Corporation

Industrial Aromatics and Chemicals

330 West 42nd Street, New York 18, N. Y.


# TRADE MARKS OF THE MONTH

*From Official Gazette—Vol. 627, No. 4 (Oct. 25) and Vol. 628, Nos. 1-3 (Nov. 1-15).*

**ACP.** Chemical preparations used in surface-treatment of metals, namely: inhibitors and activators to be added to metal pickling baths; prepaint chemicals for preparing metal surfaces to receive organic coatings; soldering fluxes; rust inhibitors—weed killers. 508,695. American Chemical Paint Co.

**MYVALUBE.** Non-petroleum lubricating oils consisting of synthetic organic liquid chemical materials for lubricating watches and other fine instruments. 508,983. Distillation Products, Inc.

**WASCO.** Disinfectant, deodorant and bleaching compound. 510,628. Wasatch Chemical Co.

**X-450.** Oil to reduce friction by lubricating the surface of sheet aluminum and foil. 514,381. United Oil Co.

**RID-ALL.** Insecticides, bactericides and preparations for pest control. 515,792. Rid-All Labs.

**PENTA WEED KILLER.** Chemical preparation for killing noxious weeds and plants. 515,936. Chapman Chemical Co.

**BUTYL.** Synthetic rubber, rubber substitutes and rubber-like materials. 517,004. Esso Standard Oil Co.

**PROP-R-OIL.** Textile oils for use in the processing of silk, rayon, nylon, wool and worsted fabrics and yarns. 517,298. W. C. Hardesty Co., Inc.

**ARM & HAMMER BAKING SODA.** Bicarbonate of soda. 517,302. Church & Dwight Co., Inc.

**BELL'S IS BEST.** Cleaning fluid, white canvas cleaner and white kid cleaner. 517,308. Bell Chemical Co.

**SERGEANT'S.** Flea soap. 517,313. Polk Miller Products Corp.

**HY-TONER.** Flat paints, semi-gloss paints, interior paints, exterior paints, wall primers, floor and wall sealers, interior and exterior enamels, house paints. 517,570. Roberts Paint Corp.

**STAZ-ON-SPRAY.** Liquid insecticide spray. 517,691. Staz-On Spraying and Dipping Service.

**DEXTROL.** Water soluble oils, softeners, and dye leveling agents. 518,348. Dexter Chemical Corp.

**FILMITE.** Lubricating oils, lubricating greases film strength oiliness additive oils, penetrating oil, plumbers' lard oil, die casting oil, cutting oil, cutting oil concentrate. 518,593. Filmite Oil Corp.

**CO-LOIDAL-AC.** Lacquer. 519,560. American Lacquer Solvents Co.

**KOOLKUT.** Cutting oils. 526,827. Pure Oil Co.

**TITE N TINT.** Mordant. 531,719. Frank H. Robertson.

**BREX.** Sudsing detergent. 533,222. Procter & Gamble Co.

**VYLON.** Vinyl copolymers in a water emulsion for coatings of paper and fabric products. 533,303. H. R. Graf Co.

**PITTCIDE.** Compositions containing available chlorine used as a bactericide, germicide, disinfectant, and deodorant. 535,870. Pittsburgh Plate Glass Co.

**PLYMOUTH.** Metallic soaps. 536,128. M. W. Parsons, Imports and Plymouth Organic Labs., Inc.

**RED CAP.** Ammonia, bluing, washing fluid, disinfectant and bleach, and germicide. 536,402. C. M. Kimball Co.

**FYR-FYTER.** Fire extinguishing chemicals. 538,396. Fyr-Fyter Co.

**KEMTEX.** Cleaner for wallpaper and painted walls. 539,429. Omar Products Co.

**NEWPORT.** Turpentine. 543,976. Newport Industries, Inc.

**CHEVRON.** Insecticides. 545,043. Standard Oil Co. of Calif.

**'HYDROXIN'.** Waterproofing composition for mixing in cement, concrete, or other masonry batches. 545,629. Kay-Tite Co.

**LURON.** Powdered hand cleanser. 547,476. Borax Consolidated, Ltd.

**disho.** Soap. 549,199. M. Werk Co.

**ACTO.** Petroleum sulfonates for use in inks and inking materials. 552,511. Esso Standard Oil Co.

**(Symbol).** Insecticides, fungicides, and vermifuges. 552,703. Ralston Purina Co.

**SPIRITTINE.** Disinfectants, deodorants, insecticides, termite oil, and creosote. 552,889. Spirittine Chemical Co.

**Formula #99.** Antiseptic liquid soap. 552-931. Armour & Co.

**TRENAMINE.** Wetting and penetrating agents. 554,067. Alco Oil & Chemical Corp.

**VULCANOL.** Coating, impregnating, and binding agents for processing of textiles, paper, leather, and/or felt. 554,068. Alco Oil & Chemical Corp.


*Free*

IF YOU sell to the chemical process industries, you should be listed—under the products you market—in CI's 900 page Annual Buyers Guide.

Just drop us a note or the attached coupon and we'll send you a questionnaire entitling you to *free* listings. We want you to be listed. It helps us make the Guide more complete and more useful; and, it benefits you too.

CHEMICAL INDUSTRIES
BUYERS GUIDE
522 Fifth Ave.
New York 18, N. Y.

Please send me the following questionnaire(s).

☐ Chemicals
☐ Chemical Specialties
☐ Equipment & Containers

Name .....

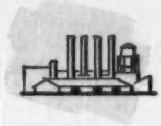
Company .....

Address .....

# *Why you should specify...*

# *HOOKER MURIATIC ACID*

**IF YOU MANUFACTURE DYES**—because Hooker Muriatic Acid is free from sulfates, oxides of nitrogen and iron, impurities that cause precipitates or add unwanted colors to benzidene dye.



**IF YOU ARE REFINING HIGHGRADE ORES**—because Hooker Muriatic Acid is free from sulfates or sulfuric acid, that cause serious losses in extraction.

**IF YOU ARE MAKING PHARMACEUTICALS OR FOOD STUFFS**—because Hooker Muriatic Acid is free from sulfates, iron and arsenic, that cause insoluble precipitates, discoloration or contamination.

**IF YOU ARE PICKLING OR CLEANING METALS** — because Hooker Muriatic Acid is free from arsenic, that may react with liberated hydrogen to form Arsine ($AsH_3$).

**IF YOU MANUFACTURE CHEMICALS**—because Hooker Muriatic Acid is of such high quality that you get better yields of better quality and without harmful side reactions.

* * *

Hooker Muriatic Acid is available in two grades—commercial (light yellow color) and Hooker White— (colorless) both free from arsenic. It is shipped in carboys or tank cars and in three strengths, 18°, 20° and 22° Baume. Hooker Technical Data Sheet No. 720 gives Hooker specifications, dilution instructions and other valuable information. Send for a copy on your company letterhead.

*From the Salt of the Earth*

HOOKER ELECTROCHEMICAL COMPANY

HOOKER CHEMICALS

3 FORTY-SEVENTH ST., NIAGARA FALLS, N. Y.
NEW YORK, N. Y. • WILMINGTON, CALIF. • TACOMA, WASH.

9-1143

SODIUM SULFIDE • SODIUM SULFHYDRATE • SODIUM TETRASULFIDE • CAUSTIC SODA • MURIATIC ACID • PARADICHLOROBENZENE • CHLORINE

Now Commercially Available

**WOLLASTONITE**

—o—

A calcium metasilicate with interesting, economical uses in ceramics, paint pigments, paper fillers, asphalt floor tiles, cement compositions, welding rod coatings, glass and rubber fillers.

—o—

**DIOPSIDE**

—o—

A calcium magnesium metasilicate with uses that overlap those for Wollastonite.

*Samples and Prices on Request*

**Producers:**

**Willsboro Mining Co., Inc.**
**Willsboro, N. Y.**

*Sales Agents:*

**MILLMASTER CHEMICAL CORP.**
420 LEXINGTON AVENUE, NEW YORK 17, N. Y.



**BORAX and BORIC ACID**

TECHNICAL • U.S.P. • SPECIAL QUALITY
CRYSTAL • GRANULATED • POWDERED
IMPALPABLE • ANHYDROUS

*Sodium Metaborate*
*Potassium Borate*
*Ammonium Biborate*
*Ammonium Pentaborate*

PACIFIC COAST BORAX COMPANY
51 MADISON AVENUE, NEW YORK 10, N.Y. • CHICAGO 16 • LOS ANGELES 14


## *CHEMICAL SPECIALTIES——*

**NYLATINT.** Coloring compounds for coloring molded, cast, and extruded nylon. 554,152. Polymer Corp.

**Cy-Tol.** Insecticides. 554,226. Geigy Co., Inc.

**WEEDONE.** Chemical preparations for exterminating weeds. 554,848. American Chemical Paint Co.

**TONKA.** Interior paint, outside paint, paint enamels, varnishes, calsomine, and colors in oil. 555,495. Forman, Ford and Co.

**KERANOL.** Finishing agent containing organic nitrogen compounds useful in wet processing of textiles. 555,981. Arkansas Co., Inc.

**COCOLOR.** Ready-mixed paints. 557,383. Patterson-Sargent Co.

**SANTOSEAL.** Adhesive cements. 557,681. Monsanto Chemical Co.

**Sayman.** Soaps and cleaners. 557,963. Sayman Products Co.

**VICARease.** Hand cleanser. 558,184. Virginia-Carolina Chemical Corp.

**Lightning.** Printing inks. 558,396. Interchemical Corp.

**Pabcohesive.** Solvent-type adhesive. 558,588. Paraffine Companies, Inc.

**WOLMAN.** Compound for impregnating forest products for preservation and fire resistance. 558,986. American Lumber & Treating Co.

**(Symbol).** Alcohols, ketones, ammonia, and soil fumigant. 559,251. Shell Chemical Corp.

**Liquid Stitch.** Chemical preparation used in stopping runs in knitted nylon, silk and rayon fabrics. 559,859. Porter Mfg. & Supply Co.

**Hi-10.** Chemical disinfectant and deodorizing preparation. 560,196. Eureka Chemical Co.

**MONSANTO.** Adhesive cements. 560,341. Monsanto Chemical Co.

**PYFOS.** Miticide and insecticide. 560,672. Woolfolk Chemical Works, Ltd.

**POLIBASE.** Emulsifying agent used in the manufacture of abrasive suspensions. 560,865. T. G. Cooper & Co., Inc.

**SOLIBASE.** Emulsifying agent used in the manufacture of abrasive suspensions. 560,866. T. G. Cooper & Co., Inc.

**ORACET.** Dyestuffs for nitro and acetyl lacquers. 560,979. Ciba Ltd.

**ORASOL.** Dyestuffs for nitro and acetyl lacquers. 560,980. Ciba Ltd.

**SAPAMINE.** Chemical products for use as auxiliary agents in the textile industry. 560,985. Ciba Ltd.

**MINASTAT. Delustering and anti-static** treatments of nylon and acrylic fabrics. 561,816. Fair Lawn Finishing Co.

**AAF.** Oily viscous liquids for use on dust collecting surfaces. 562,004. American Air Filter Co., Inc.

**GLONAP.** Synthetic washing agent. 562,123. E. F. Drew & Co., Inc.

**LOXITE.** Adhesive cement. 562,129. Firestone Tire & Rubber Co.

**RTU.** House paint. 562,548. Eagle-Picher Co.

**FLIGHT BRAND.** Agricultural insecticides and fungicides. 562,592. Carolina Chemicals, Inc.

**(Symbol).** Paint in liquid, paste, and semi-paste form. 562,670. Seidlitz Paint & Varnish Co.

**Leather-Lasting.** Dressing for leather. 562,838. B. T. Crump Co., Inc.

**PENTUNG.** Paints. 562,885. Roberts Paint Corp.

**CALOL.** Paint thinners, reducers, and solvents. 563,029. Standard Oil Co. of Calif.

**(Symbol).** Dry powdered chemical fire extinguishing compositions. 563,096. Ansul Chemical Co.

**CHEVRON.** Chemicals to prevent the freezing of moisture in storage tanks and fuel system of heating units and internal combustion engines. 563,640. Standard Oil Co. of Calif.

**MISSION BRAND.** Fertilizers and soil sulphur. 563,853. Hayes-Sammons Co.

**TEXSUN.** Fertilizers and soil sulphur. 563,854. Hayes-Sammons Co.

**LICRESOLIS.** Liquid disinfectant and deodorant. 563,882. West Disinfecting Co.

**WHITE DIAMOND.** Fertilizers. 564,144. Southern Acid & Sulphur Co., Inc.

**Somay.** Plastic roof coating, waterproofing compounds for construction materials and a caulking compound. 564,165. Somay Products, Inc.

**TAKAMINE.** Enzymic products for use in the treatment of textiles for purposes of removing sizing; adding softness, draping qualities, and luster. 564,301. Takamine Lab., Inc.

**Graph-a-cator.** Powdered graphite lubricant 564,399. Panef Mfg. Co., Inc.

**SUNEP.** Grease used as an extreme pressure lubricant. 564,483. Sun Oil Co.

**PT.** Liquid anti-freeze solutions. 564,536. Texas Co.

**TEXACO PT.** Liquid anti-freeze solutions. 564,537. Texas Co.

**Sheffield.** Oil paints, oil enamels, varnishes, and oil-colors. 565,142. Sheffield Bronze Paint Corp.

**AIR-SHOT.** Lubricating oils and greases. 565,214. Universal Motor Oils Co., Inc.

**FAIRPRENE.** Adhesive synthetic elastomer. 565,248. E. I. du Pont de Nemours & Co.

NOTES FROM THE ... NUCHAR

*purification notebook*

## NUCHAR PLUS FACTORS

Here are 8 reasons why you should use Nuchar Activated Carbon:

1. Tremendous surface area . . . 120,000,000,000 particles in every gram of NUCHAR.
2. Low total ash content . . . approximately 3 to 5%.
3. NUCHAR removes iron from such products as corn syrup, organic acids, etc.
4. NUCHAR removes side reaction products thereby giving better crystallization, higher melting point, and purer products in general.
5. NUCHAR removes invisible or colorless impurities e.g., paraffin wax from white medicinal oils.
6. NUCHAR removes oxidizing compounds such as aldehydes and ketones from alcohol used for organic esters.
7. NUCHAR has greater suspendability to keep it in contact with the impurities instead of settling out.
8. NUCHAR removes more color, odor and flavor.

On your next Activated Carbon order, buy the best . . . buy NUCHAR. And remember, our NUCHAR technicians can answer many difficult questions concerning product purification.

industrial CHEMICAL SALES

division west virginia pulp and paper company

SALES OFFICES

| | | | |
|---|---|---|---|
| New York Central Bldg.<br>230 Park Avenue<br>New York 17, N. Y. | Pure Oil Bldg.<br>35 E. Wacker Drive<br>Chicago 1, Illinois | Public Ledger Bldg.<br>Independence Square<br>Philadelphia 6, Pa. | Leader Bldg.<br>526 Superior Ave., N.W.<br>Cleveland 14, Ohio |

OTHER PRODUCTS

SNOW TOP PRECIPITATED CALCIUM CARBONATE ● LIQRO CRUDE TALL OIL
INDUSOIL DISTILLED TALL OIL ● TALLENE TALL OIL PITCH ● TALLEX ABIETIC ACID
SULFATE WOOD TURPENTINE ● ALPHA PINENE ● BETA PINENE ● POLYCEL CELLULOSE FIBERS
INDULIN (LIGNIN)

# NEW PRODUCTS & PROCESSES

## *Wool Dyes*

**New line of dyestuffs lets wool retain strength, elongation.**

A new line of Helindon dyestuffs is now manufactured by General Aniline & Film Corp., 230 Park Ave., New York 17, N. Y.

The Helindon dyes are especially suited for dyeing wool without decreasing fiber elasticity or strength. Yarn dyed with these dyestuffs shows better elongation and Helindon dyeings of fabrics have tested 10% stronger in the filling and 25% stronger in the warp than materials dyed with chrome colors.

The Helindon dyes have superior fastness to perspiration and washing. The full line of thirteen dyestuffs is offered through General Dyestuff Corp., General Aniline's sales agent.

## *Mixed-Bed Ion Exchange*

**Mixed bed of anion and cation exchangers provides "triple-distilled" water in one pass.**

Water containing less than one part of ionic solids per 100 million parts of water can now be produced by simple passage through a mixed bed of Amberlite ion-exchange resins developed by the Resinous Products Division of Rohm & Haas Co., Washington Square, Phila., Pa. The new technique permits complete removal of inorganic salts without deviation from pH 7.0.

Treatment of Delaware River water, for example, with an average hardness (as $CaCO_3$) of 69 parts per million, delivers water with an electrical resistance of 10 million ohms per centimeter from resin beds regenerated to only 50 per cent of capacity. This quality, of course, is obtained otherwise only by repeated distillations. Other asserted advantages of the new mixed-bed process include: reduced costs of both equipment and regeneration; lower rinse requirements; uniform performance in intermittent service; and a sharp breakthrough at depletion of the bed.

Mixed-bed systems are already being used for the de-ashing of carbohydrate solutions, purification of whey, and fractionation of human blood serum. Further uses for this new exchange technique are being investigated in such varied fields as agriculture, sanitation, textiles, petroleum refining, brewing and the manufacture of cosmetics. Equivalent in ionic purity to a triple-distilled product, the water is regarded as entirely suitable for the rinsing operations employed in electroplating automobile accessories, in manufacturing photographic film, and in preparing mirrors for silvering.

The mixed-bed system is claimed to have several advantages over conventional two-bed ion exchange systems: In the mixed-bed process, the solution to be treated is passed through an intimate mixture of Amberlites IRA-400 and IR-120. Such a mixed bed may be regarded as a multiple-bed deionization unit consisting of an infinite number of cation and anion exchange columns arranged alternately in a series.

## *Rapid Cr Analysis*

**Photometric method provides quick chromium analysis of stainless steels.**

A new photometric method for the determination of chromium in 18/8 and similar steels has been developed by Fisher Scientific Co., 717 Forbes St., Pittsburgh 19, Pa. The method's speed is derived from the technique of simply dissolving the steel and measuring the absorption directly, using the Fisher Electrophotometer. Nickel, the only interfering element, need not be chemically isolated since the judicious choice of a narrow band filter renders the interference negligible.

Bureau of Standard steels were determined with a standard deviation of $\pm 0.15\%$. The optimum range extends from 7% to 25%.

Copies of the method, which describe the theoretical aspects as well as a detailed procedure, are obtainable from the company.

## *Gypsum Cement*

**High-strength, low-expansion gypsum cement made with less water.**

Pure gypsum plaster casts having compressive strengths of from 10,000 to 15,000 psi may now be made with a new gypsum cement called Densite, produced by Certain-teed Products Corp., 120 E. Lancaster Ave., Ardmore, Pa. Densite has the unique property of requiring less mixing water than any other pure gypsum cement available. As a result of this property, casts made of Densite are over five times as strong as casts made with common gypsum plasters.

Densite mixes and handles like ordinary gypsum cements, and requires no special equipment for successful shop use. Present uses for this unusual material include the production of case molds, block molds, foundry patterns, models, dies for pressing plastics, cast art objects, metal casting investments, Keller machine models, floor patching compositions, tile setting cements and optical glass setting. Densite may be used wherever a cast object of great strength and hardness is desired.

Densite is available in two grades: Industrial and Low Expansion. The latter material is especially suited for applications requiring casts having a high degree of dimensional stability.

## *Protective Coating*

**Five-coat vinyl coating protects tanks against most corrosive substances.**

A new plastic coating for petroleum and chemical tanks is offered by the Glidden Co., 11001 Madison Ave., Cleveland 2, Ohio.

Called Vinyl-Cote, the new coating is an impervious tank lining which does not blister and which eliminates the peeling common to old-style plastic coatings. The field tests show that it combats corrosion and withstands sour crude, salt water, alkalies, acids and corrosive gases and fumes.

Vinyl-Cote's important new properties are derived from the vinyl copolymer resins used in its production. They give it wide flexibility and chemical resistance. The new coating also is almost totally unaffected by oils, greases and petroleum solvents and stands up well against aromatic solvents.

However, Glidden technicians point out that Vinyl-Cote is not specified for some applications. It is readily soluble in the ketone and ester group of solvents and its resin films will not withstand operating temperatures above 180° F.

Vinyl-Cote is a five-coat system, with each coat a different color, and should be carefully applied under the proper conditions. Glidden specifies the exact thickness of each coating, although this is simplified through the use of different colors. When the coat being applied completely covers the previous coat, the proper thickness has been attained.

The first test applications of Vinyl-Cote were made nearly three years ago in actual tanks in the Gulf Coast and midwestern oil fields, and today the coatings are still in excellent condition.

## *Methyl Cellulose in Ceramic Glazes*

**Methyl cellulose improves ceramic glaze characteristics.**

Methocel (methyl cellulose), a water-soluble synthetic gum, has recently been found useful as a glaze slip ingredient by the ceramic engineer interested in improving such glazed ware as dinnerware, sanitary ware and tile.

It has proved highly effective in both dip and spray methods of application. Its primary function is that of a film former, hardener, and binder. In addi-

# V-C elemental PHOSPHORUS

**VIRGINIA-CAROLINA CHEMICAL CORPORATION** has doubled its capacity to produce elemental phosphorus by the electric furnace process at Nichols, Florida, and construction of new V-C furnace operations at Charleston, South Carolina, will be completed in the spring of 1950.

These enlarged production facilities, together with V-C's major raw material resources, assure a greatly increased output of V-C Phosphorus to meet the growing demand for this basic chemical.

The purity of V-C Phosphorus surpasses all known specifications for this product. V-C Phosphorus is available for shipment in tank cars . . . or in steel drums for shipment by rail or water.

**VIRGINIA-CAROLINA CHEMICAL CORPORATION • Chemicals Division:** *401 East Main St., Richmond 8, Virginia*

**PHOSPHORUS**

**PHOSPHORIC ACIDS**
85% N.F. Grade • 85% Technical Grade
75% Food Grade • 50% Food Grade • 62½% Commercial Grade

**SODIUM PHOSPHATES**
Disodium Phosphate (*Technical and Drug Grades*)
Trisodium Phosphate • Tetrasodium Pyrophosphate
Sodium Tripolyphosphate

**CALCIUM PHOSPHATES**
Monocalcium Phosphate • Lucky Leaven® Phosphate
Phosphate Paste

VC CHEMICALS ®

tion, it serves as a suspending agent and leveler. Methocel-containing glazes reduce glaze rejects by facilitating handling, by producing a more uniform finish, by improving binding and by diminishing running and sagging.

This ceramic application has been successful largely due to the fact that efficient de-airers have been found which inhibit foaming of Methocel solutions and formation of air bubbles. Among the most effective de-airers found is Polyglycol P1200 (polypropylene glycol of 1200 average molecular weight).

Methocel contributes hardening by depositing a film from its water solutions upon drying. As a film former it produces a toughening or skinning effect which reduces fingerprinting and rub-off. As little as 0.25% on the weight of the dry glaze has been found sufficient to impart noticeable hardening to the unfired glaze coat. The maximum required for most applications is 0.5%.

Occasionally it is found that incorporation of Methocel retards the drying rate of the applied glaze. This should not cause concern unless a longer drying time is not permissible. A normal drying rate can usually be regained by replacing some of the water with alcohol, or by reducing the water content of the slip.

The dry powdered Methocel can be added to the ball mill when it is charged. Wet milling for several hours is sufficient to attain complete water solution of the particles. As pointed out above, the addition of Polyglycol P1200 (or other defoamer) is recommended and should accompany the addition of Methocel in wet milling.

A glaze slip containing methyl cellulose is patented. The Dow Chemical Co., Midland, Mich., will grant, upon written request, a royalty-free sublicense to manufacturers desiring to use methyl cellulose within the scope of the patent.

## *Actinium*

**Rare radioactive element isolated on commercial scale.**

The first industrial production of the rare radioactive element actinium, a development of interest in the fields of radioactive research and application, has been undertaken by the International Rare Metals Refinery, Inc., 630 Fifth Ave., New York City.

Actinium, the last of the natural radioactive elements to be isolated in commercial quantities, is about 150 times as active as radium, making it of the utmost value to nuclear physicists in the production of neutrons. Its other special properties also give promise of finding many vital uses in industry and medicine.

Until now no one ever saw any actinium because it was obtainable only in sub-microscopic amounts. Its presence was determined through its characteristic radiations and by spectographic and microchemical methods.

Actinium is a decay product of uranium 235. Like radium, actinium disintegrates spontaneously, giving rise to a whole series of other radioactive elements which attain a state of equilibrium with their parent, and it is the total of the actinium elements which is used in the commercial applications.

## *Styrenated Allyl Starch*

**Copolymerization with styrene improves water resistance of allyl starch.**

Although allyl starch has proved useful as a base for varnish or lacquer, printing ink, linoleum and certain other plastic compositions, it is evident that improvement of some of its properties, particularly water resistance and toughness, would further expand the number and volume of its applications.

One possible method of improving the water resistance of allyl starch—copolymerizing it with various reactive monomers—has been studied profitably at the U. S. Department of Agriculture's Eastern Regional Research Laboratory, Philadelphia.

Because of its ready availability, favorable price and hydrophobic character, styrene has received most attention thus


**Crosby Chemicals, Inc., with two large modern plants in full production and with an abundant supply of raw materials can take care of your requirements of—**

CROSBY

THE MARK OF QUALITY

STEAM DISTILLED WOOD TURPENTINE
TERPENE HYDROCARBON SOLVENTS
STEAM DISTILLED PINE OILS
HEAT TREATED WOOD ROSINS
NAVAL STORES SPECIALTIES
PAPER SIZE, ALL GRADES
RESINOUS CORE BINDERS
SYNTHETIC PINE OIL
LIMED WOOD ROSINS
PALE WOOD ROSINS
BEREZ WOOD RESIN
ALPHA TERPINEOL
RESIN SOLUTIONS
P. E. ESTER GUM
TERPIN HYDRATE
FF WOOD ROSIN
ALPHA PINENE
BETA PINENE
GLOSS OILS
ESTER GUMS
TERPINEOL
DIPENTENE
ROSIN OIL
CAMPHENE

*REPRESENTATIVES IN ALL PRINCIPAL CITIES*

**CROSBY CHEMICALS, INC.**
**DE RIDDER, LOUISIANA**
Plants: Picayune, Miss., and De Ridder, La.

important shippers say:

# YOU CAN'T *BEAT* HACKNEY STAINLESS STEEL *DRUMS*

*"Absolutely liquid-tight —no chance for leakage in or out."*

*"Can't be excelled for shipping many chemicals and food."*

*"Exceptionally lightweight —and exceedingly strong, too."*

*"Stainless steel construction insures long life and utmost resistance to corrosion."*

*"Crack and crevice-free interior leaves no place for foreign matter to lodge."*

*"Completely removable head —makes emptying and cleaning easy."*

*"Very attractive in appearance."*

All these features make Hackney Stainless Steel Drums the choice of hundreds of shippers. These straight-side drums are returnable containers, promising many years of low-cost service. They have the specially formed Hackney welded chime construction which insures a smooth bottom, so easily and positively cleaned. Thus, the advantages of easy cleaning and sanitation make Hackney Stainless Steel Drums the logical containers for many chemical and food shippers.

*Your choice of two types of closures—the famous quick-acting Toggle-tite or bolt-type closure. Send today for full details.*

***Hackney Removable Head Seamless Aluminum Bilged Barrels***

These Hackney barrels are ideal containers for many types of products—foods, chemicals, etc. They are lightweight, sturdy and economical.

Both Hackney drums and barrels are made in mild steel.

## Pressed Steel Tank Co.

Hackney

*Manufacturers of Hackney Products*

Main Office and Plant: 1499 South 66th Street, Milwaukee 14, Wisconsin • 1306 Vanderbilt Concourse Bldg., New York 17 • 208 S. LaSalle St., Room 2073, Chicago 4 • 209 Hanna Bldg., Cleveland 15 • Room 116, Postell Bldg., Atlanta 3, Georgia • 556 Roosevelt Bldg., Los Angeles 14, California

CONTAINERS FOR GASES, LIQUIDS AND SOLIDS

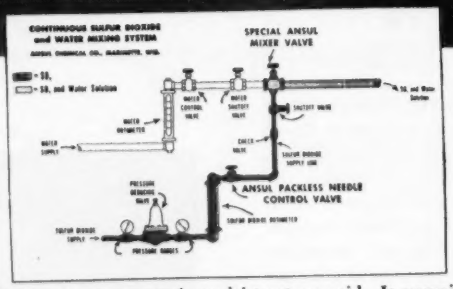
BETTER QUALITY CONTROL
IMPROVED PROCESS EFFICIENCY

IN *one* OPERATION

✓ ACIDIFY . . . or ✓ NEUTRALIZE
✓ BLEACH . . . ✓ PRESERVE
✓ DECHLORINATE . . . ✓ REDUCE
✓ DEOXIDIZE . . .

WITH AN ANSUL

CONSTANT $SO_2$ CONCENTRATION SYSTEM




Finger-tip controlled
•
Easy and inexpensive to install
•
Safer to handle and operate
•

ANSUL $SO_2$ is a volatile, easy to control, *multi-purpose* acid. It permits the user to . . . . 1) combine a number of individual process steps into one simple operation . . . . 2) easily remove many product impurities sometimes difficult to eliminate . . . . resulting in *improved process efficiency* and *better quality control* of the finished product.

LIQUID Sulfur Dioxide by ANSUL
99.98% (by weight) PURE
• REG. U. S. PAT. OFF.

Write for more information and if possible, include a description of the application in your plant. Our Technical Staff will help you take full advantage of the benefits outlined above. In addition to our Bulletin describing the Ansul Constant $SO_2$ Concentration System, we will send you an informative treatise describing the properties, characteristics and industrial uses of Liquid Sulfur Dioxide. . . . An Ansul Technical Staff Publication.

For your METHYL CHLORIDE applications Use ANSUL METHYL CHLORIDE

ANSUL CHEMICAL COMPANY
INDUSTRIAL CHEMICALS DIVISION, MARINETTE, WISCONSIN
60 E. 42nd St., New York—Lincoln-Liberty Bldg., Broad & Chestnut Sts., Philadelphia 7, Pa.

far as a possible modifier for allyl starch. The copolymerization is carried out at 65° C. in toluene-butanol solution with benzoyl peroxide as catalyst. Styrene constitutes 43 percent of the mixture. A suitably plasticized baked film of this product has excellent resistance to aqueous alcohol, dilute acetic acid, soapy water, distilled water, and acetone, and good resistance to alkalies and boiling water. The plasticized film has an elongation of over 30 percent and a (Sward) hardness of 52. It compares favorably with the better commercial varnishes based on modified phenol-formaldehyde resin and air-drying modified alkyd resin and is considerably better than unmodified allyl starch. Solutions of the styrenated product also have the advantage of greater tolerance for dilution with cheap hydrocarbon solvents than do similar allyl starch solutions of the same concentration.

The development of this improved allyl starch composition should make allyl starch more useful and easier to market. Moreover, it suggests that monomers other than styrene may be found useful in preparing improved allyl starch copolymers.

## *Vinyl Fatty Ester Polymers*

**Polymers and copolymers of vinyl fatty esters are potentially useful.**

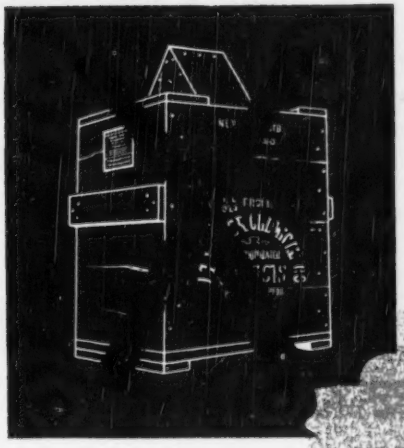
The U.S. Department of Agriculture's Eastern Regional Research Laboratory, Philadelphia, Pa., is studying the preparation of polymerizable esters from long-chain fatty acids. The polymerization and copolymerization of some of the vinyl esters were studied in detail.

These esters are readily polymerized and with the exception of polymerized vinyl hendecenoate, the polymers are thermoplastic materials that dissolve in organic solvents and vary in consistency from viscous liquids or soft rubber-like masses to solids having low melting points. Vinyl hendecenoate, however, readily undergoes cross-linking reactions to yield insoluble polymers and copolymers.

Copolymers of vinyl acetate with the vinyl esters of the saturated fatty acids are soluble in organic solvents and vary from hard, glass-like materials to rubber-like masses as the content of long-chain vinyl esters is increased. Molecular weights of the polyvinyl esters of long-chain fatty acids, in the absence of chain-transfer agents, are usually in the range of 200,000 to 400,000, although molecular weights of over 1,000,000 have also been obtained.

By employing suitable modifiers, the degree of polymerization can be controlled to yield low polymers, even dimers. The low or intermediate-molecular-weight products are potentially useful as plasticizers and lubricant additives.

# GOOD NEWS FOR NITRIC ACID USERS



## Baker now ships Nitric Acid Tech. in money-saving stainless steel drums*

Baker is waging another war on waste. No longer is it necessary to buy Nitric Acid in glass carboys. Instead you can obtain Baker's Nitric Acid in stainless steel drums, easy to handle, easy to use, and less expensive to ship.

These new money-saving stainless steel drums with splashless pouring spouts give added safety, and have many money-saving advantages.

When you order Nitric Acid Tech. be sure to specify Baker's Nitric Acid packaged in the money-saving stainless steel drums. You, too, will say, "Why didn't someone think of this method of packing before?"

J. T. Baker Chemical Co., *Executive Offices and Plant,* Phillipsburg, N. J.

*Drums are billed at $20.00, but are returnable for full credit.

**These spouts are available at five dollars each. (Also returnable)

### CHECK ALL THESE SAVINGS

1. Stainless steel drums save more than 30% in freight rates alone.
2. Stainless steel drums save freight on 50 pounds tare each way — 100 pounds in all.
3. Stainless steel drums save storage space in both freight cars and in your warehouse. Drums may be stacked five high.
4. Stainless steel drums save time and labor in trucking, handling. Drums can even be rolled, if necessary.
5. Stainless steel drums do away with the possibility of breakage.
6. Stainless steel drums save time in pouring. Stainless steel spout** quickly screws into the polyethylene gasket in the drum.

# Baker's Chemicals

C. P. ANALYZED • FINE • INDUSTRIAL

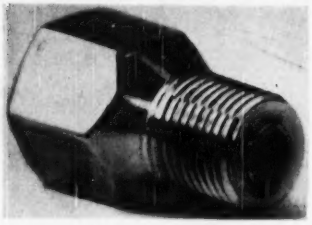
Baker's

# NEW EQUIPMENT

## *Pressure Snubber*

**Porous metal cushions pressure instruments against shock.**

Micro Metallic Corp.'s new all monel pressure snubber is available from Chemequip Co., 193 Bradford St., Brooklyn 7, N. Y. They protect pressure gages and other pressure instruments from shock due to sudden pressure development or release. The pressure impulse is cushioned by the snubber so that a stable



indication is reached quickly without instrument vibration.

The snubbers also filter the fluid entering the gage, and prevent foreign matter from entering the pressure elements. Unlike snubbers which utilize small orifices, the filter element is not affected by dust or dirt in the line.

The pressure snubbers may also be used to filter instrument air, or for other filtration jobs where small quantities of gases or liquids are to be freed of solids.

The mean pore diameter of the snubber for gases is 0.0002". Snubbers are provided in four porosities, respectively, for use with oil, water, gas and with mercury manometers.

The snubber is provided with ¼" npt and ½" npt connections and fits directly onto a ¼" or ½" pipeline, increasing the length of the line by about ¾" or 1¼" respectively. No adapting connections are required. Other threads are available to order.

## *Stainless Steel*

**Low carbon, no "stabilizer," makes new stainless steel resist corrosion.**

Carnegie-Illinois Steel Corp. has designed a new "low-carbon" type of stainless steel. Carbon content is reduced to a maximum of 0.03% while maintaining the chromium-nickel ratio of the usual "18-8" stainless steels. This reduction cuts chemical corrosion of stainless steels because much of it is encountered in deposits, composed mostly of carbon, between the microscopic steel grains.

Previously, it was necessary to add columbium or titanium to austenitic 18-8 stainless steels as "stabilizers" to render the alloy less susceptible to such intergranular corrosion.

Test samples of this new stainless steel have been boiled in 65% nitric acid for 240 hours without corroding between the grains. Later, they were boiled 500 hours in copper sulphate and sulphuric acid without corrosion. The acid tests were made after the steel had been heat-treated at 1000-1625° F.

Welding tests have demonstrated that these low-carbon 18-8 materials can replace stabilized types for those applications, like welding, that involve short heating times at elevated temperatures. Their mechanical properties in every instance are quite comparable to the higher carbon grades of 18-8 stainless steel.

## *$SO_2$ Analyzer*

**Gases containing sulfur dioxide can be detected by new automatic analyzing equipment.**

Developed by Dr. M. D. Thomas of American Smelting & Refining Co. (U. S. P. 2,462,293), the new $SO_2$ analyzer is now available for the first time as a complete assembly manufactured by Leeds & Northrup Co., 4934 Stenton Avenue, Philadelphia 44, Pa., as the Thomas Autometer.

This equipment continuously records actual concentration of sulfur dioxide in ppm; and records average concentration integrated over a half hour period, automatically checks its "zero reading" every thirty minutes, and marks off each cubic foot of air sampled.

Usual range of the equipment—0 to 5 parts $SO_2$ per million—covers the concentrations which are of interest in pollution surveys. Changes in concentration as small as a few tenths of a part per million can be readily detected.

The Autometer utilizes electrolytic conductivity as a means of measurement. A continuous sample of air is passed through a solution which absorbs $SO_2$, causing a change in the electrolytic conductivity of the solution.

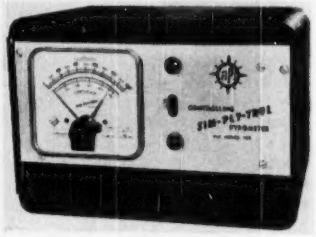
• A **triangular scale,** made by Wolsey Co., Inc., 727 Kohler St., Los Angeles 21, Calif., for architects and engineers, made of Vinylite rigid plastic sheet strips gripped by an aluminum core gives far longer wear than conventional scales at less than one-seventh the price.

• Tempil® Corp., 132 W. 22nd St., New York 11, N. Y., has developed additional **high temperature** ratings of Tempil® **pellets** to indicate 2100°, 2200°, 2300°, 2400° and 2500°F.

## *Automatic Control*

**New control responsive to changes of one-half microampere or fraction of a millivolt.**

The new Simplytrol automatic controller of Assembly Products, Inc., Chagrin Falls, O., when calibrated in millivolts and furnished with dial graduations marked in degrees of temperature, makes an easily installed pyrometer control. With instrument rectifiers and cur-



rent transformers the Simplytrol will indicate and control alternating currents and voltages.

The Simplytrol consists of a contact meter-relay with built-in micro-contacts (Pat. Applied For), and load relay rated at 15 amperes, 115 volts, 7½ amperes, 230 volts load. There is also an interrupter relay for the micro-contact locking circuit. All relays have snap action switches for positive contact. An isolating power transformer with 110 and 220 volt connections, rectifier and filter system supply power for the relays.

• The C. M. Kemp Mfg. Co., 405 E. Oliver St., Baltimore, Maryland, is marketing two new fully-automatic **inert gas generators**—models 1 MIHE and 2 MIHE. Rated at 1000 and 2000 cfh respectively, the inert gas analysis of 87-88% $N_2$ and 13-12% $CO_2$ is maintained at any point from 20% to 100% of rated capacity. Adjustment can be set to be free of $O_2$ in the presence of a small amount of combustibles, or completely free of combustibles in the presence of a small amount of $O_2$. Water vapor is equivalent to saturation at discharge temperature.

• A newly developed 1200°F HS **thermal system** of Taylor Instrument Cos., Rochester 1, N. Y. Provides simple, dependable and less expensive means of measurement and control of temperatures above the conventional 1000°F indication. Outstanding features include a newly developed Bourdon type spring, Type 347 stainless steel thermal element, compensation for varying case and ambient temperatures and uniformly graduated charts. Range spans of 1000°F, 600°F, and 400°F, or equivalent Centigrade are available. No system can be furnished in which the range starts at temperatures below 700°F.

# CHEMICO P·A VENTURI SCRUBBER

# STOPS ACID FUMES

THESE PHOTOGRAPHS—taken at a pigment plant in Pennsylvania—show how effectively the Chemico P-A (Pease-Anthony) Venturi Scrubber solves the problem of waste sulfuric acid fumes. Instead of pouring from the large stack, the fumes are diverted into the Chemico unit. An infinitesimal residue is emitted through the small stack at the left of the brick chimney. The P-A Venturi Scrubber, in fact, eliminates the need for a large stack.

## HERE ARE THE ACTUAL RESULTS OF THIS INSTALLATION:

### Sulfuric Acid Mist Loading

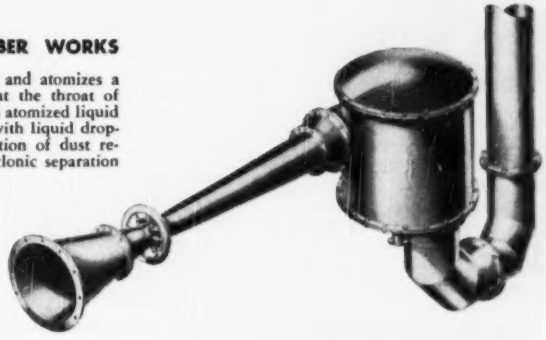
| INLET TO SCRUBBER | EXIT FROM SCRUBBER | EFFICIENCY |
|---|---|---|
| 283 mg $H_2SO_4$ per cu ft | 1.06 mg per cu ft | 99.6% |

The P-A Venturi Scrubber is highly effective and very economical to install and operate. It is recommended for (1) smoke abatement, (2) removal of dust and mist from gases and (3) recovery of valuable metals and chemicals.

This Chemico unit is simple and safe to operate and maintain. Any competent maintenance man can service a P-A Venturi Scrubber. No special skill is needed. Write us concerning your problem.

### HOW THE P-A VENTURI SCRUBBER WORKS

Dirty gas, at high velocity, impinges upon and atomizes a curtain of liquid introduced through jets at the throat of the Venturi. Differential velocities of gas and atomized liquid result in collision of mist or dust particles with liquid droplets. The coalescence of mist or agglomeration of dust resulting from this collision makes simple cyclonic separation possible.



## CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

EMPIRE STATE BLDG., 350 FIFTH AVENUE, NEW YORK 1, N. Y.

EUROPEAN TECHNICAL REPRESENTATIVE

CYANAMID PRODUCTS LTD., BRETTENHAM HOUSE, LANCASTER PLACE, LONDON W. C. 2, ENGLAND

CABLES: CHEMICONST, NEW YORK

CC 194

*Chemico Plants are Profitable Investments*

• A new thermostatically controlled **screw-plug immersion heater** is being produced by the Edwin L. Wiegand Co., 7557 Thomas Blvd., Pittsburgh 8, Pa. One-half inch diameter hairpin tubular elements are welded or silver-soldered into a standard screw-plug for easy mounting. Standard heaters are fabricated of either copper heating elements with a brass screw-plug, or steel elements with a steel screw-plug. The built-in thermostat has a temperature range of 60°-250° F. or 200°-550° F. Temperature is controlled by an adjustment knob on the outside of the housing. The thermostat bulb is encased in a protective well mounted on the screw-plug and extending between the heating elements. The well is constructed of the same material as the tubular elements. Heaters are rated from 1.5 to 10 kilowatts for 115 and 230 volt operation, single or 3-phase. For use where spray, fumes, drippings, etc. constitute a hazard, the entire terminal assembly and thermostat can be housed in a Crouse-Hinds moisture-resistant or explosion-resistant terminal cover.

• A new **gas mask,** effective against hydrogen sulfide and petroleum vapors, is available from Wilson Products, Inc., Reading, Pa. The mask consists of facepiece, corrugated breathing tube, canister, and new back harness.

The special back canister harness, with a shoulder hook to hold the cor-

rugated breathing tube, permits more freedom of movement for the wearer. This is especially desirable in tank gauging or similar bending and stooping work. The new gas mask has the U. S. Bureau of Mines approval BM-1444. The mask is not air-supplied and should not be used where the oxygen content may fall below 16%.

• A new line of **centrifugal pumps** has just been added by Marlow Pumps, Ridgewood, N. J. The new centrifugals, types SC & SL, are primarily for installations with flooded suctions and are offered in close- or long-coupled construction 1'-4". sizes and with capacities from 10—1000 gpm. They may be operated in either vertical or horizontal position.

An enclosed-type impeller eliminates need for a second wearing ring. Motors, from 0.5-30 HP, are splash protected and equipped with moisture resistant insulation. Explosion proof or fully enclosed motors are also available.

• A new research **spray dryer** is being made by the Swenson Evaporator Co., 30 Church St., New York 7, N. Y. Its small size, 5-25 pounds per hour of evaporation, quickly determines whether a material can be spray dried, permits testing of premixed plant batches, and provides a method of producing relatively small quantities for evaluation.

The drying chamber can be direct-fired, heated with electricity or steam. Product is collected in a stainless steel cyclone or bag, while a two-fluid atomizing system using compressed air is used.

• Podbielniak, Inc., 341 E. Ohio St., Chicago 11, Ill., is now producing a laboratory model of their **centrifugal solvent extraction unit,** Model 5500. Made of type 316 stainless steel, with 10-15 stages and a capacity of 100-500 cc. per min., operating equilibrium is reached in a few minutes.

• A new combination **crusher-sizer** has been placed on the market by Gifford-Wood Co., Hudson, N. Y.

Called the "Economiser," the new unit will crush all semi-friable materials, resins, pottery clay, quartz, plastics and similar materials. It will handle lumps up to 10" x 10" and produce three grades or sizes through slotted fixed screen openings, ½" x ¼" and 1¼" x 2". It has a capacity of 200 lbs. of crushed material per minute. The breaker can be adjusted to produce any proportion of the three grades to meet customer's requirements. Operating upkeep is almost eliminated by two shafts operating in anti-friction, grease sealed ball bearings. Power is supplied to breaker and screw conveyor by a single 1½ HP motor directly connected to the breaker.

• A new, large-capacity **hydraulic materials handler** for dumping liquids or solids into high level kettles or tanks has been developed by Lee Metal Products Co., Inc., Philipsburg, Pa.

With this new Lee Handler one man can empty a 500-pound barrel, or a 55-gallon drum in less than a minute—and with no mess or spill. No power, other than water from the plant water main, is required.

The Handler is mounted on 6" rubber-tired casters, and can serve a battery of tanks or kettles. The lifter can also be fitted with a stainless steel trough and hopper into which dry or liquid products may be dumped and mixed before elevating.

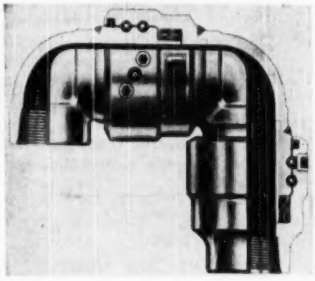
• Two new instruments—one a completely redesigned millivoltmeter-indicating **controller,** the Pyr-o-Vane controller, and the second a Protect-o-Vane controller designed to protect a furnace, oven or a process from excess temperatures—are being introduced by Brown Instruments division of Minneapolis-Honeywell Regulator Co., 4427 Wayne Ave., Philadelphia, Pa.

Control is effected by a light metal vane which moves in and out of an electrical field. Snap-action control. absence of motors and non-cyclic correction are outstanding features.

The Protect-o-Vane is described by the company as a companion piece for the Pyr-o-Vane controller, many of the components being interchangeable. It shuts off heating sources when temperatures go beyond a set limit.

• An improved **ball-bearing swivel pipe coupling** has been designed to convey fluids under high pressure through a pipe that swivels or rotates a full 360 degrees in all planes . . . by Gil-Lair Products, Inc., 81 Masonic Court, Pasadena, California.

This unit has no projection and is free from bolted flanges, threaded sleeves, locking rings and keys. The rotating members of the coupling are



held together with two sets of ball-bearings. The all-flex double, metal-backed packer assembly, which renders the unit pressure tight, consists of two packers each comprised of a "T" shaped metal backer to which a pair of synthetic rubber lips are bonded. Each backer functions in its own individual chamber. The edges of the metal backer flare outward against the walls of the packer recess forming a full metallic seal under all pressures. This combination synthetic and metallic packer seals all pressure from vacuum to 12000 psi.

• Only 11" high, the new **filter-regulator** of C. A. Norgren Co., 222 Santa Fe Drive, Denver, 9, Colo., combines filtering and pressure regulating in one unit. It is used with any non-corrosive gas at pressures up to 125 psi and

## Now EVERY laboratory can use modern spectrophotometric methods

# THE BECKMAN "MODEL B" SPECTROPHOTOMETER

*accuracy . . . speed . . . simplicity*

**AT A NEW LOW PRICE**

Spectrophotometric measurements—based on analysis of liquid, solid or gaseous samples by light absorption—have become one of the most important methods of today's process control operations. Complicated analyses requiring hours to perform by standard chemical procedures are now completed in a matter of minutes using modern spectrophotometric methods.

Up to the present, *quality* instruments have been beyond the reach of many laboratories. Now, however, the development of the new Beckman Model "B" Spectrophotometer makes available for the first time a *precision* instrument—convenient and simple to operate—*yet versatile, accurate and low-priced.*

The Model "B" combines many of the advancements pioneered in the famous Beckman Quartz and Infrared Spectrophotometers . . . high resolution . . . wavelength and photometric accuracy . . . freedom from stray light . . . wide spectral range . . . quality construction.

It features direct reading absorbance and transmittance scales . . . complete elimination of stray light from 360 to 1000 millimicrons—less than 1½% even at 320 millimicrons . . . interchangeable phototubes for wider wavelength range . . . inexpensive sample cells . . . 4-position cell carriage for faster readings . . . and many other important features.

The Model "B" is by all standards the outstanding instrument in its field. Write for full details. *Beckman Instruments, National Technical Laboratories, South Pasadena, 17 Calif.*

### The "Model B" is *THE* Ideal Instrument For Simplifying Routine Analyses

Regardless of the nature of your laboratory operations—determination of impurities, control of quality, simplifying process control, color matching and control, or any of a wide range of other procedures—chances are you can speed up your analyses and greatly simplify your work by adopting modern spectrophotometric methods.

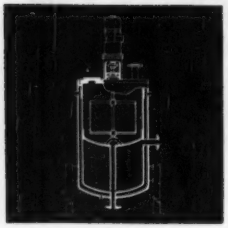
But remember—**the accuracy and reliability of spectrophotometric analyses are no better than the instrument you use.** So be sure to check all the features of the Beckman "Model B" Spectrophotometer—compare this instrument point by point with **any** other in its field—and you'll readily see why it is, by all standards, the outstanding spectrophotometer in its price range.

Here is an instrument carefully engineered so that stray light effects are negligible . . . an instrument where readings can be reproduced on sample after sample without "drift" or other inaccuracies . . where band widths can be readily varied to permit the high resolution required in many analytical problems . . . where a variety of absorption cells can be used interchangeably to provide optimum path lengths . . . and where many other outstanding features are provided to assure maximum versatility, accuracy and dependability.

Be sure to get the full details on the many money-saving, time-saving applications for the Beckman "Model B" in today's chemical laboratories . . . and on the many unique advancements built into this instrument that make it such an outstanding value in its price range. **See your authorized Beckman dealer—or write direct for complete data.**

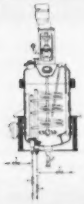
* Beckman Instruments include: pH Meters and Electrodes • Spectrophotometers—Radioactivity Meters—Special Instruments

# *5 Additional KETTLE DESIGNS by PATTERSON-KELLEY



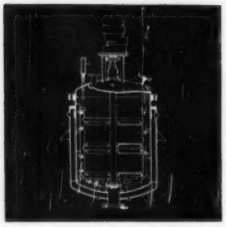
**K Vacuum Wax Impregnating Centrifuge**

Steam-Jacketed with upper and lower chambers under separate pressure controls. Hot wax is in lower chamber while basket is being charged. For impregnating phase, wax is forced to upper chamber; after impregnation, pressures in two chambers are equalized and the basket spun to eliminate excess wax which returns to lower chamber.



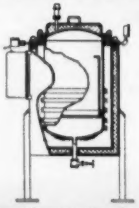
**L High Pressure Hydrogenator**

Combines electrical and steam heating; steam passing through an internal coil being used to shorten initial heating-up period; electrical heating elements provide desired high operating temperature. Reaction completed, cold water is admitted to steam coil to promote rapid cooling.



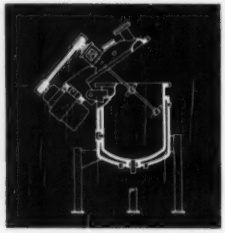
**M Nicotine Extractor**

Heavy duty unit for processing powdered tobacco; meets the need for scraping type agitator and sparger system for uniform distribution of steam to all parts of the charge; steam enters through sealed hollow shaft at the top, passes out through perforated paddle arms; special dump valve at bottom.



**N High Pressure, Electrically-Heated Sterilizer**

Completely self-contained with automatic pressure control switch, safety valve and insulated jacket.



**O Vacuum Process Vessel**

Sanitary type; unique setting of motor counter balancing quick opening cover, permits quick and clear access for cleaning out; all interior parts polished; multi-speed motor.

**Designing Special Kettles is an important phase of Patterson-Kelley service. We have, of course, standard carbon steel and stainless steel jacketed kettles in a wide range of sizes. But we are greatly experienced in designing special kettles to meet unusual conditions, as illustrated. In writing for further information, describe fully your requirements.**

*Offices or Representatives in Principal Cities*

the K Patterson-Kelley Co., Inc.

15 Lackawanna Avenue East Stroudsburg, Pa.

*Send for our Kettle Bulletin


ambient temperatures up to 120° F.

Filter has directional inlet which creates centrifugal action, throwing moisture and entrained solids against bowl, where they run down into a quiet zone beneath the baffle. Screen of reinforced 200-mesh monel wire removes remaining solids.

Regulator performance has larger diaphragms and valve ports. High air flow with low pressure drop is assured because of baffle plate and siphon tube action. Regulator responds rapidly to sudden demands for large volume, without excessive momentary pressure drop.

• A new water-tight dry chemical **fire extinguisher** has been introduced by Ansul Chemical Co., Marinette, Wis. Twelve new design features are incorporated. Special seals inside the nozzle and receiver have made these two vital parts water-tight. Other important changes in the Model B are new threaded hose connections, new cartridge guard finger grip and redesigned carrying handle.

The Ansul Model B Extinguisher is available in 20 and 30 lb. sizes.

• The new line of **temperature indicators,** produced by General Electric's Meter and Instrument Divisions, Schenectady 5, N. Y., includes cold-end compensated thermocouple thermometers for temperatures up to 3000° F and resistance thermometers for temperatures up to 300° F.

The thermocouple thermometer is available in two sizes: Type DO-71 with a 3½" flange and the DW-71 with a 2½" flange.

Designed for the measurement of low temperatures where high accuracy is important, the resistance thermometers are available in two standard types: the DB-15 long-scale instruments and the Types DD-6 and DD-7 6" rectangular, surface- and flush-mounted instruments.

• An improved **high pressure seal,** for equipment handling hydrocarbons under high pressures and temperatures, is available from Felt Products Mfg. Co., Packing Div., 1508 Carroll Ave., Chicago 7, Ill.

Three major improvements are incorporated: Improved control and balance of hydraulic pressures eliminate excessive sealing face wear. The number of parts susceptible to wear and deterioration are reduced to minimize operational maintenance. A simplified cooling method eliminates the need for auxiliary cooling systems.

Fel-Pro Type H-P Seals handle a variety of liquids at pressures up to 600 psi and temperatures up to 250°F. in centrifugal pumps and other equipment handling oils, gasoline, propane, etc.

(*Turn to page 295*)

# The ABC's of Powell Valve PERFORMANCE

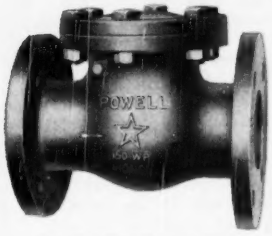



**Fig. 2433-M**—150-pound Monel Metal* Swing Check Valve with flanged ends and bolted flanged cap. Disc has ample lift to permit full, straightway, unobstructed flow through the valve body.

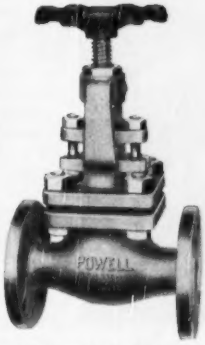



**Fig. 1969-NI** — 150-pound Nickel Gate Valve with flanged ends, bolted flanged yoke-bonnet and outside screw stem. 4-bolted flanged bonnet Angle and Globe Valves in this design are also available.

Powell Flush Bottom Tank Valve. Made in two designs: **Fig. 2309,** in which disc rises into tank to open valve; **Fig. 2310,** in which disc lowers into body of valve.

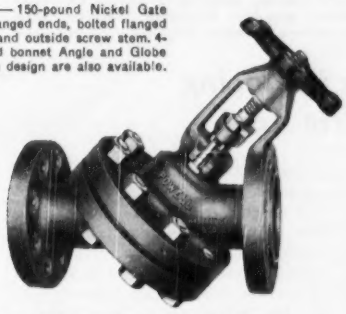


**Fig. 1095-HA**—300-pound Hastelloy† Separable Body, Reversible Seat "Y" Valve. Lower half of body can be unbolted and turned through arc of 180° to make a 90° Angle Valve.

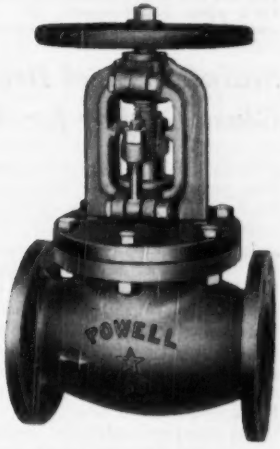



**Fig. 2429**—150-pound Stainless Steel Globe Valve with flanged ends, bolted flanged yoke and outside screw stem.

Always the right valve. And, because Powell can always furnish the *right* valve, you can avoid failures that result from trying to make a valve "do" in a service to which it is not *specifically* adapted, as well as those caused by misapplication.

Built to last. Powell Valves are designed for long life at a minimum cost of maintenance. The cost of construction and materials of any Powell Valve is determined solely by the requirements of the service for which the valve is designed.

Complete Line. Powell Valves are made in all types such as Globe, Angle, "Y", Gate, Check, Non-return and Flush Bottom Tank. Materials include not only Bronze, Iron and Steel but also a wide range of Corrosion-Resistant metals and alloys.

**Ask your nearest Distributor—or write direct**

*Registered trade-name of the International Nickel Co., Inc.

†Registered trade-name of the Haynes-Stellite Co.

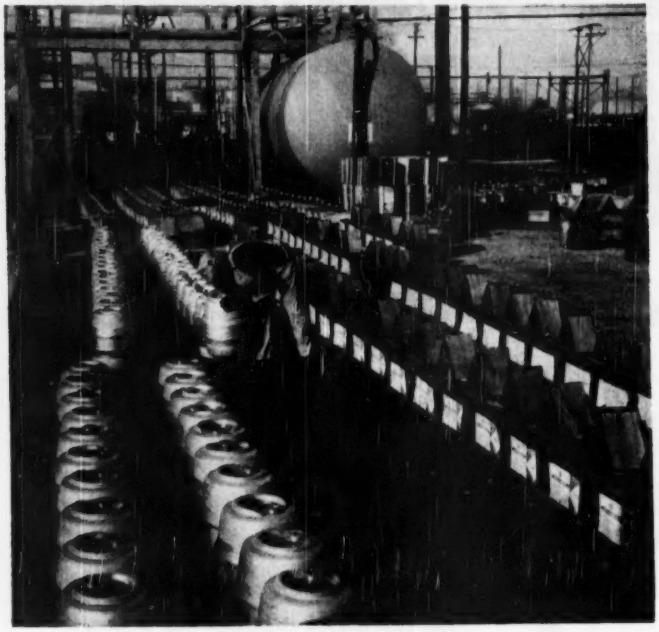
**The Wm. Powell Co., Cincinnati 22, Ohio**

**DISTRIBUTORS AND STOCKS IN ALL PRINCIPAL CITIES**

# POWELL VALVES

# PACKAGING & SHIPPING

*by T. PAT CALLAHAN*



***Old and new acid containers at nitric acid loading point in Monsanto Chemical Co.'s plant in Monsanto, Ill. Lighter, sturdier 15-gallon stainless steel welded drums will replace traditional carboys as latter become unserviceable.***

## *Stainless Steel Drum Replacing Glass Carboy for Nitric Acid*

FOR THE PAST 40 years, the conventional method of shipping nitric acid in the chemical industry has been in the glass carboy which is either a 5-, 6½-, or 13-gallon bottle enclosed in a wooden box with various forms of cushioning applied to eliminate shocks and breakage. The carboy has proved through the years to be an invaluable method of shipping nitric acid and would continue to be the most acceptable method were it not for a recent development of the Firestone Steel Products Co., Akron, Ohio.

This company originally developed stainless steel bilge type barrels for the shipment of beer and through research and engineering, has improved the construction of this drum to make it acceptable to the Interstate Commerce Commission for shipping nitric acid. This new stainless steel drum has a capacity of 15 gallons and a tare weight of 24 pounds. Comparing this to the conventional 13-gallon carboy which has a tare weight of approximately 70 pounds, there is a very sizable saving on freight both in shipping a filled container and returning an empty container.

It is anticipated that the repairs on the new stainless steel drum will be very slight as compared to the repairs which must be made on a 13-gallon carboy after it has been in service for a given period of time. Several of the large manufacturers of nitric acid have already adopted the Firestone stainless steel drum to replace the 13-gallon carboy, and with the saving in freight and the longer anticipated life of the stainless steel drum over the carboy, considerable economies will be effected by such a move.

The specifications for the Firestone stainless steel nitric acid drum are as follows:

MATERIAL

BODY: 16 Gauge Stainless Steel Type 304
CLOSURE: Type 304 Stainless Steel

CONSTRUCTION

BODY: 3 Piece Inert Gas Shielded Arc Welded
CLOSURE: Screw Type, 2"—11½ I. P. S. Straight Thread with Polyethylene Gasket

CAPACITY

15 Gal. Nominal

TARE WEIGHT

24 Pounds

TEST

Immerse in water and test for leaks at 80 psi with dry air.

Before the stainless steel drum was approved by the ICC, it was filled with water to 98% capacity and dropped from a height of six feet on concrete floor. This drop was continued for seven successive drops as follows:

1. Diagonally on plug.
2. On head opposite to plug.
3. On longitudinal welded seam.
4. On circumferential welded seam, landing on I bar rail.
5. On longitudinal welded seam on rail.
6. On juncture of longitudinal and circumferential welded seams on I bar rail.
7. On bottom weld striking on 3" dia. steel ball resting on steel base top of ball 6" from floor.

It was also subjected to a hydrostatic test of 80 psi held for 5 minutes without any evidence of drop in pressure; a pressure test for the gasket consisting of a container hydrostatic-loaded to 300 psi without leakage; and corrosion tests made in accordance with ASTM specification A-262-44T.

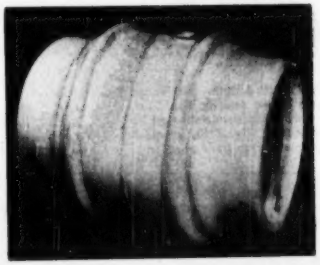
### *CSC Begins Shipping Chemicals by Water*

With the reopening of the Ouachita River in Louisiana to navigation, Commercial Solvents Corp. has inaugurated the shipment of chemicals by water transportation for the first time since the war.

The first such shipment, consisting of 250,000 gallons of methanol, has recently been made by tanker barge from the company's plant at Sterlington, La., to New Orleans. The chemical will be transshipped by tanker at that city to points on the eastern seaboard. Several trips each month are planned.

CSC's methanol plant at Sterlington, completed last year at a cost of $4.6 million, has dock-loading facilities. Located on the Ouachita River which leads to the Mississippi, the plant has easy access by water to northern and eastern sections of the country.

### *New Aluminum Drum*



A 55-gallon drum (Model A945), which meets Rule 40 Consolidated Freight Classifications is the latest addition to the

***save up to 46¢ per cwt.— package your product in***

# St. Regis

## *Polyethylene Coated* multiwall paper bags

Today a wide variety of food and chemical products that formerly required packaging in expensive, heavyweight containers is being satisfactorily packed and shipped in St. Regis Polyethylene-coated Multiwall Paper Bags—*saving as much as 46 cents per hundred pounds.*

This saving arises not from the lower container cost alone, but from lower storage, freight and packing costs, lower container tare-weight, and lower handling costs as well.

These new St. Regis Multiwall Paper Bags give your product *special* protection. They are highly resistant to greases, oil, moisture, alcohol, alkalies, and most acids. They retain their characteristics under wide temperature variations. The polyethylene coating on the inner kraft ply is inert, non-toxic, odorless, and gives it greater strength.

If the requirements of your product have led to high packaging costs, it will pay you to find out about St. Regis Polyethylene-coated Multiwalls. Your nearest St. Regis Sales Office will gladly give you full details.

SALES SUBSIDIARY OF ST. REGIS PAPER COMPANY

**ST. REGIS**

**SALES CORPORATION**

**230 PARK AVENUE • NEW YORK 17, N. Y.**

Allentown, Pa. · Atlanta
Baltimore · Birmingham
Boston · Chicago
Cleveland · Denver
Detroit · Houston
Kansas City, Mo. · Los Angeles
Louisville · Minneapolis
New York · Norfolk
Ocala, Fla. · San Francisco
Seattle · St. Louis

In Canada:
St. Regis Paper Co. (Can.) Ltd.
Montreal · Hamilton · Vancouver

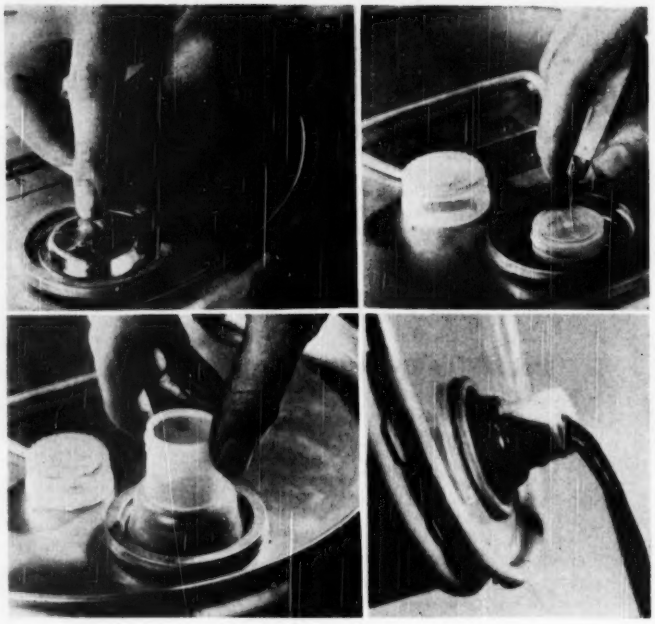
***YOU BUY PROTECTION WHEN YOU BUY MULTIWALLS***

line of aluminum drums manufactured by Benson Manufacturing Co., Kansas City, and sold nationally by Kaiser Aluminum & Chemical Sales, Inc. It is made of two drawn one-piece shells welded at the center circumference.

### *Flex Spout Closures for Five Gallon Pails*

Five gallon pails fittted with a leakproof and tamperproof seal deliver their contents without wasting a drop. Under the metal seal is a pouring spout molded of flexible Bakelite polyethylene which is resistant to most chemicals and solvents, and a threaded cap of the same tough plastic.

The shipping seal is destroyed by tearing it off with a knife or similar tool (see cut, upper left). With the threaded cap off, the airtight seal is broken by cutting out the diaphragm molded into the spout mouth (upper right). The flexible spout is then pulled out so that it protrudes from the pail, ready for pouring (lower left). When the liquid is about to be poured, it can be seen through the translucent spout, which also helps prevent spilling and waste by confining the flow.



Furnished on both lug-covered and tight-headed pails, the seal-spouts are crimped on the latter in a single operation after the pails have been filled. The closure withstands greater internal pressures than the pail itself, and a filled pail can be dropped six feet on the seal without breaking it, according to the manufacturer.

This combination seal-spout for five gallon pails is manufactured by Rieke Metal Products Corp., Auburn, Ind., and sold to pail manufacturers to be fabricated into the pail cover.

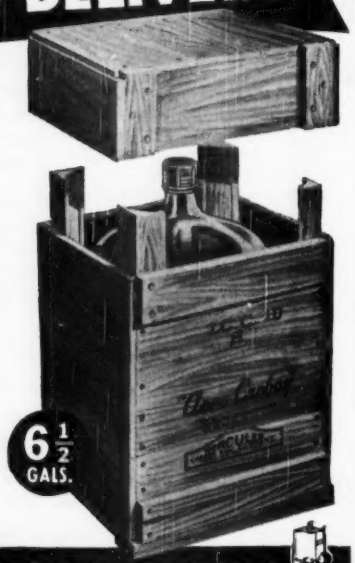

PROMPT DELIVERY

HERCULES *Aero*
(RUBBER CUSHIONED)
AND
HERCULES
(CORK CUSHIONED)
CARBOY BOXES

*available in*

*5 & 13 gallon sizes to comply with ICC-1A.*

*Available in 6½ gallon size to comply with specification ICC-1D.*




NATIONAL BOX & LUMBER COMPANY
HOME OF HERCULES CARBOY BOXES • NEWARK 5, N. J.


### *Materials Handling Truck*

A new manually operated materials handling truck, called the Liftomatic, is designed to eliminate hooks, "pronged noses," and additional manpower in moving containers with chimes. Several chemical companies aided in its research and testing, and its practicability, safety, and economy is extending its use in the industry. It is available from Marvel Industries, Inc., 7738 N. Austin Ave., Skokie, Ill.

It has an actuating jaw that closes or opens on the chime automatically when leverage is exerted on the step or handle, effecting pick-up or release. This makes it possible for one container to be removed from an entire line without disturbing the others, or for drums to be placed on scale platforms without jarring balance. Moreover, drums of any diameter are handled with equal ease. Containers 7 inches to 4½ feet high can be easily conveyed by adjusting jaw assembly. The jaws will not open if surface traveled over is rough, weight shifts in container, or corners are cut shape. Jaws correct "off center" pick-ups, without damage to chime.

Housing is of special aluminum alloy. Handles are placed at the best angle for full utilization of operator's energy. Main

# You can't beat these drums!

Your product may be one of the thousands of items for which a fibre drum is just about the perfect package. And there are some thumping good reasons why a Continental fibre drum is the best drum you can use.

**Continental fibre drums can't be beat for rugged durability.** They give extra protection to both expensive and dangerous articles for shipment either in this country or abroad. The closures are tight and strong —but easy to open and close.

**Continental fibre drums can't be beat for shipping economy.** Their light tare weight means savings at today's high freight rates—even greater savings on export shipments to countries where import duties are levied on the gross weight.

**Continental fibre drums can't be beat for appearance.** They are neat and trim, tailored to your product, and feature quality printing or spray painting. Each Continental drum is a style leader in its field.

**Most important, Continental can't be beat for service.** There are four strategically located Continental fibre drum plants ready to give you fast, economical and dependable service. Continental packaging engineers are always ready to give you sound advice on packaging problems. Backing up these engineers is a modern laboratory staffed with qualified research and development people.

Continental is big enough and flexible enough to handle any situation. Again and again Continental customers say, "You make us feel as though your fibre drum department is part of our own company." We'd appreciate an opportunity to show you how much real help and service we can deliver.

## These drums can help you boom sales

1. The famous Continental LEVERPAK drum with its unique lever-locking device gives maximum protection under hard usage. 12- to 75-gallon sizes.
2. Continental FIBERPAK drum . . . a rigid, all-fibre container in ¾- to 67-gallon sizes.
3. Continental STAPAK drum. Has fibre body with metal top and bottom. Supplied in 2- to 32-gallon sizes.
4. Continental UPAK drum. Custom-made for the shipment of rolled materials.

# CONTINENTAL CAN COMPANY

PAPER CONVERTING DIVISION • FIBRE DRUM SECTION
VAN WERT, OHIO

New York • Philadelphia • Pittsburgh • Tonawanda • Cleveland
Chicago • St. Louis • Los Angeles • San Francisco • Eau Claire

# How Aqua-Vactors Produce Vacuum with Water

**•C-R AQUA-VACTOR USES WATER AS MOTIVATING FLUID**

Combining the advantages of the steam jet ejector and the low cost of water, the Croll-Reynolds AQUA-VACTOR is employed economically in many instances. Low in first cost and with no moving parts, the water jet may be used to mix liquids, serve both as an ejector and condenser, and in isolated cases, handle air and gases.

While not as efficient as a steam jet ejector, the AQUA-VACTOR becomes economical when the pressure of water is being dissipated for other process work. In such cases it may be possible to use the AQUA-VACTOR either as an ejector alone or as both an ejector and a condenser using water under pressure to operate the AQUA-VACTOR and using the exhaust from the AQUA-VACTOR for other processes.

The illustration shows a type SW EVACTOR using steam in the first stage and water in the second stage. Here the AQUA-VACTOR is used both as an ejector and as a condenser, handling air and, at the same time, condensing steam from the first stage. Of interest to engineers with corrosion problems, the steam stage in the illustration is constructed of carbon including the steam nozzle. The carbon is incased in case iron giving the equipment the strength of iron and the corrosion resistance of carbon.

For more complete information concerning the application of the AQUA-VACTOR, or any type of steam jet EVACTOR, write today to:

CROLL C R REYNOLDS

**CROLL-REYNOLDS CO., INC.**

**17 John Street, New York 7, N. Y.**

**CHILL VACTORS STEAM JET EVACTORS CONDENSING EQUIPMENT**

MANUFACTURING CHEMISTS

# CAMPHORIC ANHYDRIDE

**for**

**Mercurial Diuretics**

# LAMEX CHEMICAL CORP.

***Makers of Fine Chemicals and Pharmaceuticals***

**Plant: Birmingham, Alabama**

***Sole Distributors***

**OLIVIER COMPANY, INC.**

**25 Broadway, New York 4, N. Y.**

**Digby 4-4543 Cable: Austrasia, New York**

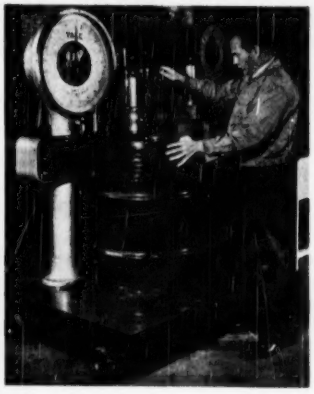

post is of welded square section. Full roller bearing wheels are designed to eliminate greasing and provide smooth, noiseless transportation. Chemically resistant tires will not work off, and need no inflation. All moving or vulnerable parts are treated to eliminate corrosion.

A series of welded, solid steel attachments are available for the Liftomatic Materials Handling Truck that adapt it for carrying cartons, carboys, or tote boxes. These can be attached or removed by one man in less than a minute through use of guide channels that are a permanent part of the carrier.

Overall length is 5 feet; overall width, 23 inches; capacity, 1000 lbs.; wheel diameter, 8 x 2.50; axle diameter, 7/8 inch; and shipping weight, 40 lbs.

## *Drum Filler Eliminates Hazards, Saves Money*

A completely mechanized and air-operated automatic system for filling drums with any kind of vegetable or mineral oil, paints, varnish, acetates, carbon



tetrachloride and other liquids is available in the new precision drum filler of the Yale & Towne Mfg. Co., New York.

The new device is said to be the only filling equipment on the market which will automatically cut off the flow of explosive liquid, without any fire or explosion hazard customarily experienced with electrical equipment. Automatic, air-operated tare beams and other controls eliminate the need for manually or electrically operated controls.

To begin the filling operation operator merely flips a lever to position the nozzle over the bunghole of the drum (see cut). Tare beams are then manually set for the net amount of liquid to be stored in the container, but this has to be done only for the first drum. At the same time, the tare weight of the container is automatically ascertained by the filler. The varying weight of succeeding drums is quickly offset by flipping a lever which actuates the air-operated control. At the same time,

# CLOSES MULTIWALLS

"clam-tight"

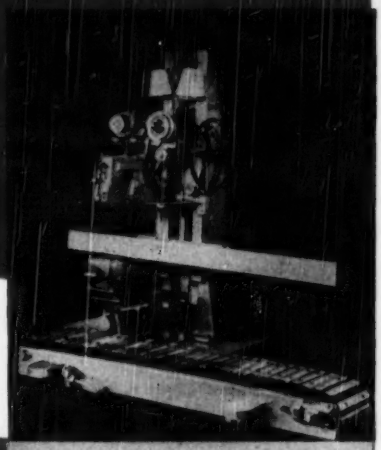
## AT HIGH SPEEDS!

Your packaging time drops sharply when you're operating with a BAGPAKER.® Picture the savings from a machine that closes up to 15 heavy-duty multiwall paper bags per minute—a rugged long-lasting machine, too! And there's more than enough strength in a tough BAGPAKER closure. It's made with the "cushion stitch", which absorbs strains and won't pull out.

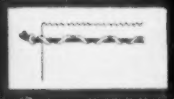
Check the features of both BAGPAKER models shown at the right. One provides high speed, dependable closing; the other, in addition, gives a closure that resists moisture and is proof against contamination and sifting.

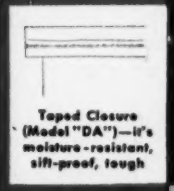
You're apt to discover more profitable closing and handling methods . . . more efficient multiwall bag uses, by discussing your needs with a BAGPAK engineer.

The famous BAGPAK® "cushion stitch"

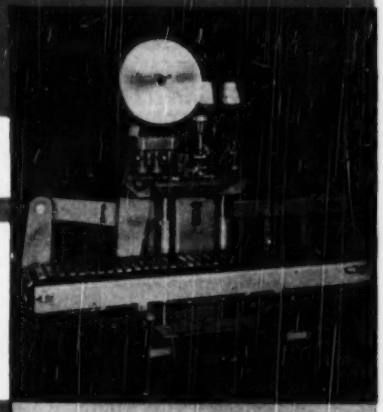


**MODEL "E 1"** (portable)—closes up to 15 bags per minute. A single foot pedal controls both conveyor and sewing head. Handles both paper and textile bags.





Taped Closure (Model "DA")—it's moisture-resistant, sift-proof, tough



**MODEL "DA"** (portable) applies tape over "cushion stitch", making a tight seal. One operator, filling and closing, can handle 2 to 4 bags a minute . . . 6 to 12 where filled bags are delivered to BAGPAKER conveyor. Sewing operation starts and stops automatically—no tape wasted.

BAGPAK DIVISION

INTERNATIONAL PAPER COMPANY, Bagpak Division • 220 East 42nd Street, New York 17

Branch Offices: Atlanta, Baltimore, Boston, Chicago, Cleveland, Denver, Spokane, Kans., Los Angeles, New Orleans, Philadelphia, Pittsburgh, St. Louis, San Francisco.

In Canada: Continental Paper Products, Ltd., Montreal, Ottawa.

# OLDBURY

ELECTRO-CHEMICAL COMPANY

•

| | |
|---|---|
| PHOSPHORUS (Yellow or White) | PHOSPHORIC ANHYDRIDE |
| PHOSPHORUS OXYCHLORIDE | PHOSPHORIC ACID |
| PHOSPHORUS TRICHLORIDE | SODIUM CHLORATE |
| PHOSPHORUS PENTACHLORIDE | POTASSIUM CHLORATE |
| PHOSPHORUS PENTASULFIDE | POTASSIUM PERCHLORATE |
| PHOSPHORUS SESQUISULPHIDE | HYPOPHOSPHITES |
| AMORPHOUS PHOSPHORUS | OXALIC ACID (Powdered or Crystal) |

ZINC PHOSPHIDE

•

*Plant and Main Office:*
NIAGARA FALLS, NEW YORK

*New York Office:*
19 RECTOR ST., NEW YORK 6, N.Y.

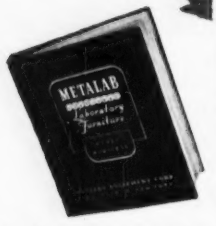


**THIS MAGNIFICENT TRANSITION—**

from drab...

...to METALAB

--points the way to




Send for this new Complete Catalog on Laboratory Furniture and Equipment.

• **GREATER PRESTIGE:** Install "METALAB", and immediately your time-worn laboratory springs to life! Or, if you are installing a new lab, it will be outstanding with "METALAB."

Beautified with "METALAB", your lab becomes a joy to behold . . . an impressive exhibit for visitors . . . an inspiration for your personnel.

• **INCREASED EFFICIENCY:** Endowed with the ultimate in functional design, engineered for maximum utility, "METALAB" equipment reduces waste motion . . . increases speed and quality of work.

• **GREATER ECONOMY:** "METALAB" equipment looks "custom-built" — but actually it is mass-produced in Sectional Units in a large modern plant. The machinery, tools, and dies of our own exclusive design are engineered to produce superior standardized installations within your budget.

SECTIONAL LABORATORY FURNITURE and EQUIPMENT by

METALAB Equipment Corp.

1533 Dean St., Brooklyn 13, N. Y.


the operator sets pointer on the dial for the net amount of liquid to go into drum. A press of a button fills the drum through air-operated nozzle to 6 oz. accuracy in a 52-gal. tank.

This device will fill any size container from one quart up. A 52-gal. drum of SAE #30 oil can be filled in 49 seconds. Since one man alone can do the whole job of filling and weighing with little expenditure of effort, handling time is considerably reduced.

## *New Loading Method Is Faster and Cheaper*

To make it possible for customers to reduce the time and expense of unloading pigments and metals from freight cars, New Jersey Zinc Co. has developed new loading methods for shipment of its products. Many customers have already adopted these labor-saving materials-handling methods and report excellent results.

The new loading methods are based on unit loads, which make it possible to handle pigment or metal with fork-type lift trucks. This bulk handling not only facilitates removal of the shipment from the freight car, but it simplifies the storage and movement of their products in the customer's plant.

## *New Truck Widens Scope of Skid and Pallet Loads*

The SpaceMaker is a new electric tiering truck with which Lyon-Raymond Corp., 5566 Madison St., Greene, N. Y., has entered the electric power lift truck field. Its main feature is its maneuverability which permits tiering from narrow aisles and in areas where conventional tiering trucks cannot operate.

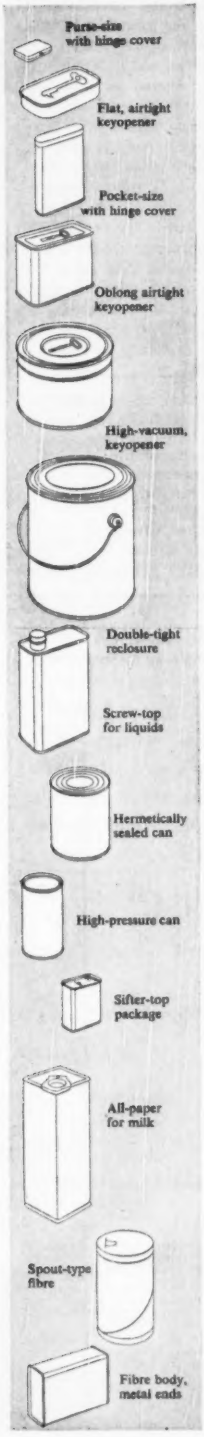
In warehouses where ten to twelve-foot aisles have previously been needed to tier 48" x 48" pallet loads, the new truck will tier at right angles from a six-foot aisle. In a congested manufacturing department where box type skids had never previously been tiered due to lack of aisle space, 24" x 36" box skids have been right-angle tiered from a five-foot aisle.

In addition to increasing useable floor and air space by narrowing of aisles, the SpaceMaker makes possible tiering of skid and pallet loads in areas where it has been considered impractical. Among these are upper floors in multistory buildings where the floor and elevator capacities are insufficient for use of the conventional heavier power trucks.

The new truck is claimed by the manufacturer to be the lightest, shortest and most maneuverable of such trucks on the market. At present it is furnished in three different types: 1. Platform type—for tiering skids; 2. Fork type—for tiering single face pallets; 3. Straddle type—for tiering two-faced pallets.

The new truck is the result of several years research and tests in actual use.

**WHICH PACKAGE SUITS YOUR PRODUCT?**



**"OB-ROUND"** shape means more cans pack in shipping container; more squirt per squeeze—from bellows-action sides that won't stick. Three heights (same size base): 1 oz; 3 oz; 4 oz. Full space for litho-label in many colors. Two types of closing machines available—for high-speed and for semi-automatic, limited production.

**NECKS** are integral part of top and are lined with synthetic rubber compound which is oil and solvent-resistant for effective sealing.
**SPOUTS** available in moulded plastic, transparent or colored, or extruded soft metal.

# If the consumer uses your product in small amounts at a time...

***this packaging suggestion may interest you***

**TWO USEFUL PRINCIPLES** are apparent in Canco's familiar lighter-fluid and household oil container.

The little nozzle dispenses a small amount at a time, and the screw top makes a tight reclosure for a volatile liquid.

**In addition to lighter fluid**

Immediately, it looks as if this container would be adaptable in some form to cologne, liquid deodorants, sun-tan lotions, cleaning fluids, polishes, rubbing alcohols, and oil and other liquid hair preparations.

How about this container for viosterol and other highly concentrated liquids requiring measurement by drops?

It's a thought to consider, and perhaps your package-development people and ourselves should talk things over.

**Since 1901,** Canco has been out front in creating new and more effective packages. There is hardly a major development in the packaging industry—whether it be for a food or non-food product, whether the problem is metal, or fibre, or a combination of both—that this keen, alert organization has not pioneered.

Canco can help you with eye-catching label designs, cost-cutting, sales-building advice on packages, processes, filling and closing.

Canco stands ready to serve you promptly in production-line emergencies. From Canco you get as many containers as you need when you need them. Let's get together! *Call Canco first . . .*

AMERICAN CAN CO.
CANCO
NEW YORK
CHICAGO
SAN FRANCISCO
HAMILTON, CANADA

# PLANT OPERATIONS NOTEBOOK

## *Red Lead Best*

**Battelle Memorial Inst. study shows red lead to be most resistant to corrosion of 34 systems tested.**

"Red lead appears to be outstanding" for enclosed structural members in steel housing construction, according to a recent study by H. A. Pray and R. S. Peoples, of the Battelle Memorial Inst., for the American Iron and Steel Inst. Some 34 kinds of paint systems were studied during the testing.

Experiments with the many well-known and established paint coatings included: (1) continuous immersion in water; (2) contact with air at high humidity; (3) continuous condensation; (4) alternate wet-dry conditions, and (5) continuous contact with insulation in the presence of water. The tests were intended to simulate both severe and moderate conditions of service and "should form a basis for valid comparisons between the effectiveness of the coating systems studied."

In one phase of the testing one painted panel was damaged by scratching it lengthwise through the paint film to base metal. In the case of damaged films exposed to immersion in water, "only System C (red lead) offered protection to the bare steel in the damaged zone. In fact, for the majority of the other systems, continued exposure would have resulted in actual perforation of the base metal in this area in a relatively short period of time."

As the report stated, "It (red lead) has a good blister rating, it affords excellent protection to the base metal, as evidenced by low weight loss and slight visual evidence of attack on the steel and . . . penetration and undercutting at the damaged zone are negligible or slight."

## *NOMOGRAPH-OF-THE-MONTH*

Edited by DALE S. DAVIS

# *Vapor-Liquid Equilibrium*

by JOSEPH I. LACEY
Hooker Electrochemical Co.
Niagara Falls, N. Y.

MANY distillation calculations can be made with the aid of boiling point or x—y diagrams. For binary mixtures that obey Raoult's law, values of x and y can be calculated from the vapor pressure data for the pure compounds.

As shown by Badger and McCabe (1), at a total pressure of one atmosphere,

$$x = \frac{1 - P_H}{P_L - P_H} \qquad (1)$$

and

$$y = P_L x \qquad (2)$$

Equation 1 can be written as

$$\frac{P_L}{P_H} - \frac{1 - P_H}{xP_H} = 1 \qquad (3)$$

which is of the basic nomographic form:

$$Uf_1(t) + Vf_2(t) = 1 \qquad (4)$$

In Equation 3 the functions are such that it is possible to construct the accompanying nomograph which permits simultaneous determination of the compositions of the binary liquid and vapor phases when the vapor pressures of the components at the same temperature are known. For example, the vapor pressures of benzene and toluene at 105°C are 1532 and 645 mm. of mercury, respectively; find the values of x and y. Since benzene is the low boiling component, connect 1532 on the $P_L$ scale with 645 on the $P_H$ scale and read the desired mole fractions of benzene in the liquid and vapor phases as 0.130 and 0.260 on the x and y scales, respectively.

### Nomenclature

$P_H$ = Vapor pressure of the high boiling component

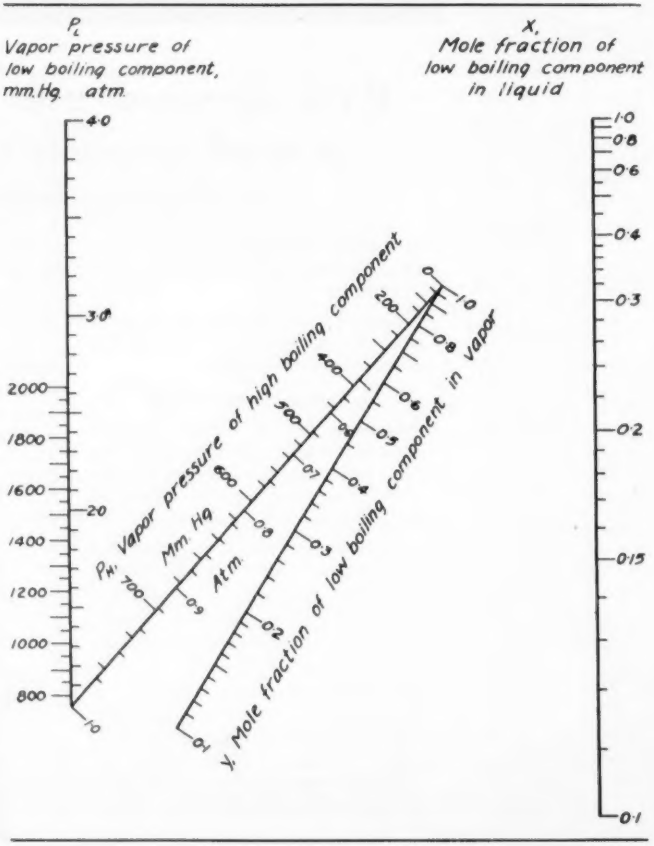
$P_L$ = Vapor pressure of the low boiling component

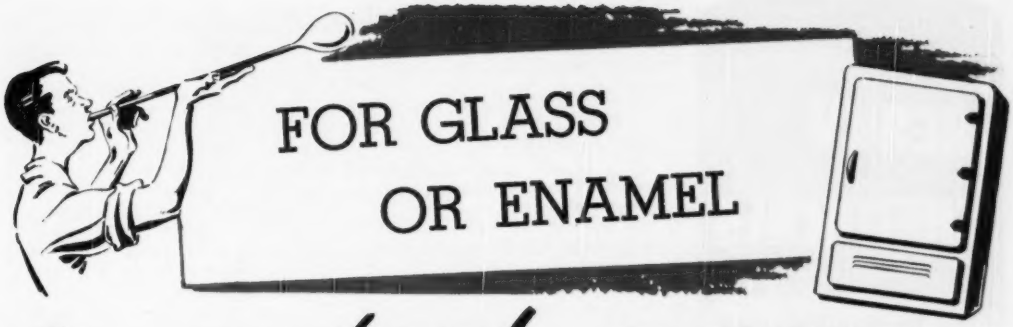
x = Mole fraction of low boiling component in the liquid phase at equilibrium

y = Mole fraction of the low boiling component in the vapor phase at equilibrium.

### Literature Cited

[1] Badger, W. L. and McCabe, W. L., "Elements of Chemical Engineering," 2nd ed., p. 327, New York, McGraw-Hill Book Co., 1936.


$P_L$
Vapor pressure of low boiling component, mm.Hg atm.
x,
Mole fraction of low boiling component in liquid
Vapor pressure of high boiling component
$P_H$, Mm. Hg
Atm.
y, Mole fraction of low boiling component in vapor



# FOR GLASS OR ENAMEL

## *You can depend on Stauffer's* BORAX

INDUSTRY has learned to depend on Stauffer's Borax as a fluxing agent in glass, enamel, salt glazing, frits and pottery glazes. It is being used increasingly as a practical alkali in textile and tanning baths. Write today for complete information on the use of Stauffer's Borax as the natural starting material for the manufacture of a host of inorganic and organic chemicals; and its advantages when used as a mild food preservative, a mild alkaline antiseptic in dentifrices, an important minor fertilizer or as an effective herbicide.

### GRADES

Technical, 99½-100% Pure—U.S.P. Fine Granulated and Powdered

### TYPICAL ANALYSIS

| | *Technical* | *U.S.P.* |
|---|---|---|
| Sodium Borate ($Na_2B_4O_7 . 10\ H_2O$) | 100.3-103.0% | 100.3-104.0% |
| Boron as $B_2O_3$ | 36.5-37.6% | 36.5-37.9% |
| Chlorides as NaCl | 0.04-0.06% | 0.015-0.03% |
| Iron as Fe | 3 to 8 Ppm | 2 to 4 Ppm |
| Arsenic as $As_2O_3$ | 4 to 8 Ppm | 2 to 6 Ppm |
| Carbonates and sulphates | nil | nil |

### OTHER STAUFFER PRODUCTS

BHC (Benzene Hexachloride)
Boric Acid
Carbon Bisulphide
Carbon Tetrachloride
Caustic Soda
Chlorine
Citric Acid
Cream of Tartar
DDT (Dichloro Diphenyl Trichloroethane)
Silicon Tetrachloride
Sodium Hydrosulphide
Sulphur (Specially processed for all industrial uses)
Sulphur Chloride
Sulphuric Acid
Tartaric Acid
Textile Stripper
Titanium Tetrachloride
Toxaphene (Chlorinated Camphene)
2,4-D (Acid, Isopropyl Ester, Amine Salts)

Stauffer CHEMICALS SINCE 1885

**STAUFFER CHEMICAL CO.**

420 Lexington Avenue, New York 17, N.Y. · 221 North LaSalle Street, Chicago 1, Illinois
824 Wilshire Boulevard, Los Angeles 14, Cal. · 636 California Street, San Francisco 8, Cal.
424 Ohio Bldg., Akron 8, O. · Apopka, Fla. · N. Portland, Ore. · Houston 2, Tex. · Weslaco, Tex.

to manufacturers of

HEAVY CHEMICALS

The Nicolay Titlestad Corporation offers

the finest services for the design and construction of heavy chemical plants. Our experience includes the plants and processes listed below and our facilities are available to you for consultation and contracting on *any* chemical engineering problem *anywhere* in the world.

Before you build, expand or modernize your equipment, in any of the fields listed below, write for complete details concerning our services and recommendations. We supply the right answers quickly! No obligation . . .

**Designers, Manufacturers, Engineers, Constructors of**

| | | |
|---|---|---|
| Sulphuric Acid Plants | Phosphoric Acid Plants | Hydrochloric Acid Plants |
| Nitric Acid Plants (all types) | Carbon Disulphide Plants | Ammonia Oxidation Units for Chamber Plants |
| Sulphur Dioxide Plants | Formaldehyde Plants | |
| Fertilizer Plants (all types) | Ammonium Sulphate Plants | Sulphuric, Nitric and Phosphoric Acid Concentrators |
| Acid Proof Masonry Designs and Materials | Ore Roasting Plants | Acid Sludge Recovery Plants |

530

NICOLAY TITLESTAD CORPORATION

11 WEST 42nd STREET
NEW YORK 18, N. Y.

The 64-page study of paint systems has been distributed to members of the Iron and Steel Institute as No. 31 of a series entitled "Contributions to the Metallurgy of Steel."

## *Safer Centrifuges*

**Clear plastic sheet cover allows operator to observe filling operation, prevents splashing.**

The National Safety Council recently described a method used by C. L. Chapman of Mountain Copper Co. to safeguard centrifuge operators.

In one operation, a 40" centrifuge spins the mother liquor from small crystals. When new, this centrifuge was equipped with a hinged metal cover, which the operator left open during the filling operation. This unsafe condition was solved by substituting a piece of clear plastic sheet, ¼" thick, which is hinged in exactly the same manner as the original metal cover.

This sheet enables the operator to observe the filling cycle and prevents spillage from splash, and is a very effective safety device.

## *Where to Get Information on Solvents*

**Information on solvent safety available from many sources.**

Since improper handling of solvents may lead to fire or illness, it is important to be well informed about the liquids in use in the plant or shop. Information on the properties of the solvents employed and the safety of solvent-using processes may be obtained from a number of organizations and agencies.

The manufacturers are interested in preventing solvent accidents, and are therefore a major source of information on the properties and correct handling procedures for the chemicals they produce. In many cases, the solvent distributor can supply the necessary information, or can direct questions to the manufacturer who is directly concerned.

The Manufacturing Chemists' Association, to which solvent manufacturers belong, publishes detailed Safety Data Sheets on a great many products and these may be purchased from its Washington, D.C., office. The National Safety Council, which has its headquarters in Chicago, Ill., is another organization which publishes data sheets on the safe use of various solvent materials. The National Fire Protection Association, in Boston, Mass., publishes standards and other literature on the handling of flammable solvents.

There are also various governmental industrial hygiene agencies which can supply information on solvents and solvent processes. In addition, these agencies can supply various services, such as a check of the solvent process, a survey of ventilating equipment, examination of employees for symptoms of solvent exposure, and assistance in planning a safety program. In general, these services are available without charge.

Literature and data on health aspects may be obtained from the Industrial Hygiene Division of the U. S. Public Health Service, which has its headquarters in Washington, and also has District Offices throughout the country.

State agencies also publish literature and render the services described through State Bureaus of Industrial Hygiene. These are located in the State Department of Health, except in Massachusetts and New York, where they are part of the Labor Department. A number of cities have municipal hygiene departments which can render assistance.

## *Costs Reduced With Electric Heaters*

**Electrical heating of pipelines less costly than steam.**

Brooks Oil Co. in Cleveland, O., manufacturer of extreme pressure lubricants, have reduced operating costs by installing General Electric Calrod tubular heaters on storage tank pipe lines to provide heat to reduce lubricant viscosity.

During manufacturing this heavy compound oil flows through a series of temporary storage tanks. Because of its high viscosity a temperature of 375° F. must be maintained for free flow of the oil. Steam heat under pressure was formerly used to heat the tanks and pipe lines. But operating costs were high due to high heat loss and uneven heat distribution.

Calrod tubular heaters are now clamped to the base of each tank. They have also been wound around the pipe lines and

***Actual installation of Calrod heated lines at Brooks Oil Co., Cleveland, O.***

covered with protective layers of sheet metal and asbestos to cut heat loss to a minimum. Thermostatic control provides even distribution of heat throughout the pipe lines.

# ZIRCON

## Zirconium Silicate—
## 67% $ZrO_2$ + 33% $SiO_2$

FOR HIGH MELTING POINT,
HEAT SHOCK RESISTANCE,
LOW THERMAL EXPANSION,
ACID AND CORROSION RESISTANCE,
HIGH MECHANICAL STRENGTH,
GOOD ELECTRICAL RESISTIVITY.

### MECHANICAL, THERMAL, CHEMICAL AND PHYSICAL PROPERTIES

| | | |
|---|---|---|
| Crystal Structure | | Tetragonal |
| Bulk Density— | | |
| Granular Zircon | 180 lbs./cu. ft. | 0.104 lbs./cu. in. |
| Milled Zircon | 102 lbs./cu. ft. | 0.059 lbs./cu. in. |
| Fired Rammed Body | 216 lbs./cu. ft. | 0.125 lbs./cu. in. |
| Fired Slip Cast Body | 250 lbs./cu. ft. | 0.139 lbs./cu. in. |
| Thermal Conductivity cal/°C/sec/cm/cm (Up to 700°) = 0.031 BTU/°F/sec/in/sq. ft. | | = 0.0258 |
| Mean Specific Heat | (21-31°C) | 0.132 gal/gram/°C |
| Softening Point | | 3452°F (1900°C) |
| Cold Modulus of Rupture | Rammed Body— | 1600-2600 psi |
| | Slip Cast Body— | 7000-8000 psi |
| Melting Point | (2200-2260°C) | 4000-4100°F |
| Thermal Expansion (mean reversible 20°-1000°C) | | 4.5 x $10^{-6}$/°C<br>2.5 x $10^{-6}$/°F |

Insoluble in aqueous alkaline solutions and in all acids

### ELECTRICAL PROPERTIES

| | | |
|---|---|---|
| Dielectric Constant E | | 12 ± 1 |
| Resistivity at °F in Megohms/in.³ | 1100° | 170 |
| | 1200° | 120 |
| | 1300° | 70 |
| | 1400° | 35 |
| | 1500° | 7 |
| | 1600° | 2.5 |

### IN HIGH TEMPERATURE APPLICATIONS

Such as pyrometer tubes—gas turbine combustion chambers—cyanamide processing containers—aluminum resmelting—phosphate, sulphuric acid and silica gel processing furnaces, Zircon offers definite advantages. Its properties make it an ideal body constituent in certain electrical porcelains. As a mold and core wash ingredient, it is in increasing demand and is receiving considerable attention as a mold material in precision alloy casting.

Granular and milled zircon of various purities are available also in addition to zircon refractories, ramming mixes and cements. During years of research and practical experience, a fund of information on the properties, applications and potentials of zircon compounds has been built up.

Specific data and practical suggestions may be obtained through our field engineers or by writing our New York office direct.

TAM
PRODUCTS
Registered U. S. Pat. Off.

TAM is a registered trademark.

## TITANIUM ALLOY MFG. DIVISION
NATIONAL LEAD COMPANY

Executive and Sales Offices: 111 BROADWAY, NEW YORK, N. Y. • General Offices and Works: NIAGARA FALLS, N. Y.

AMMONIA
(REFRIGERATION GRADE)

DIRECT SERVICE
FROM
PRODUCING POINT
TO USER IN

TANK CARS
and
CYLINDERS

Discuss contract
shipments or
spot orders with

SPENCER
SPENCER CHEMICAL COMPANY
Executive & Sales Offices: Dwight Bldg., Kansas City 6, Mo.

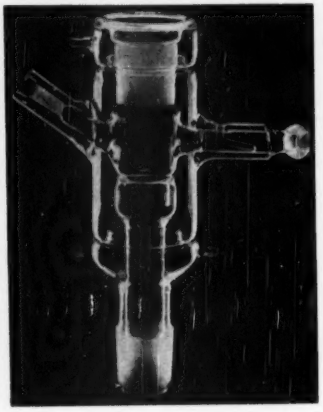
# LABORATORY NOTEBOOK

## *Fractionating Column*

**Additional temperature-measuring facilities have been provided in the Glenlab feed sections for laboratory fractionating columns.**

The new Glenlab feed sections of Glass Engineering Labs, 521 O'Neill Ave., Belmont, Calif., is used to permit insertion of a continuous feed at an intermediate point in fractionating columns.

A well is included to accommodate a 3" immersion thermometer or thermo-



couple directly in the rising vapor stream and a second thermocouple well is located in the input-connector projection and positioned for intimate contact with the fluid at minimum rates of flow.

Other features of the feed sections for 1-in. and 2-in. columns are thermal-insulating jackets (as illustrated) with high vacuum pumped at high temperatures; an observation window in the jacket silvering for measurement of liquid return; temperature-compensating bellows to permit operation up to 500° F., and of internal-convolution design to minimize the possibilities of mechanical damage; and a general arrangement with short external projections and a maximum of structural strength.

Either spherical glass or standard-taper glass joints can be supplied on top and bottom connections, to match corresponding column sections. Feed sections are available to fit 1", 2", 3" and 4" columns.

## *Analytical Grade of Ion Exchange Resins*

**Rohm and Haas Co. now supplying C.P. ion-exchange resins.**

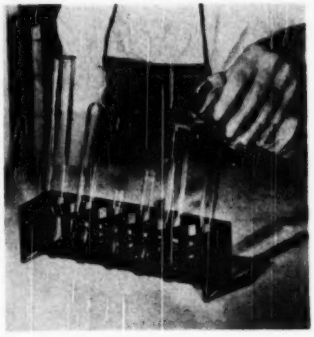
For research and analytical studies, standard Amberlite ion exchange resins are now being produced in a "C.P." form by the Resinous Products Division of Rohm & Haas Co. They are supplied exclusively, in quantities less than 25 pounds, through Eimer & Amend of New York and Fisher Scientific Co. of Pittsburgh and St. Louis.

By careful refining these materials are freed from traces of fines and soluble intermediates which might remain in the standard products. As a result, the refined resins may be used for analytical or theoretical studies.

Development of these grades now gives the laboratory worker a complete selection of ion exchangers for the removal of positively or negatively charged ions from clear solutions over the entire pH range. Resin grades available are: Amberlites IR-100 and IR-105, strongly acidic cation exchangers of the sulfonic acid type, effective in the pH range 4 to 8.5; the weakly acidic, carboxylic acid type cation exchanger, IRC-50, with a pH range of 6 to 14; the weakly basic anion exchanger, IR-4B, whose range extends from pH 1 to 7, and IRA-400, a strongly basic anion exchanger, operable over a pH range of 1 to 10. Amberlite XE-81, a purified mixture of a strongly basic anion exchange resin and a strongly acidic cation exchange resin, is operable over a pH range of 0 to 14 and permits the deionization by the "mixed bed" method.

## *Test Tube Rack*

A test tube rack of new design holds six tubes of varying sizes at a slight tilt so they can be easily filled by pouring. The rack, distributed by Central Scientific Co., is molded of Bakelite phenolic plastic. Contents of each tube are visible



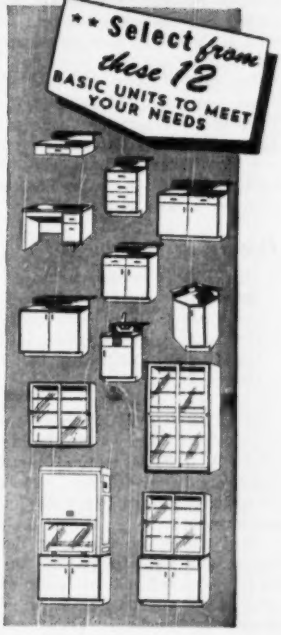
clear to the bottom, and an inverted tube rests in the novel pocket, uncontaminated by inside contact with a pin or peg. Every pocket will hold tubes from 2⅜"-8½" long. Measuring only 8½" long by 2⅜" wide and high, the racks stack readily and take little space in use.

# FISHER *Unitized* Laboratory Furniture

*A* completely *New System* for Equipping a Laboratory

## Available for Shipment from Stock

The unique Fisher Unitized Laboratory Furniture is adaptable to almost every need regardless of laboratory size or type of work to be done. It is featured by all-steel construction, Kemrock working surfaces, streamlined design and distinct advantages that eliminate engineering, manufacturing or installation delays.




### Easy to Obtain and Install

Measure the space available—select the desired units—obtain from stock. Any handy man can assemble it.

*Write for the free catalog describing and illustrating this new Fisher Unitized Laboratory Furniture.*

*Headquarters for Laboratory Supplies*

**FISHER SCIENTIFIC CO.**
717 Forbes St., **Pittsburgh (19), Pa.**
2109 Locust St., **St. Louis (3), Mo.**

**EIMER & AMEND**
Greenwich and Morton Streets
**New York (14), New York**

In Canada: Fisher Scientific Co., Ltd., **904 St. James Street,** Montreal, Quebec

# INDUSTRY'S BOOKSHELF

## *Soaps and Detergents*

SOAPS AND DETERGENTS, by *E. G. Thomssen and John W. McCutcheon,* MacNair-Dorland Co., New York, N. Y.; 1949; 511 pp., $9.00.

THIS NEW TEXT was written to bring up to date, in a completely new form, *Modern Soap Making,* by E. G. Thomssen and C. R. Kemp, which was published twelve years previously. In setting forth the numerous advances of the past decade, the authors discuss continuous soap-making processes, commercial production of synthetic detergents, and application of new equipment and materials. They have endeavored to present material, out of twenty years' actual experience in the soap plant, of a practical nature for the practical soapmaker.

The first chapter includes processing oils from primary and secondary sources and the discussion of fatty acids, which was included in the glycerine chapter in previous editions. The chapter on machinery and equipment has been broadened in concept, as have the chapters on soap making and soap products. Two entirely new chapters have been added: "Perfuming and Coloring Soap" and "Synthetic Detergents." A table of surface-active agents, their uses, formulas, and manufacturers are included in the appendix. There are many illustrations of scenes in soap plants.

## *Detergent Standards*

A. S. T. M. STANDARDS ON SOAPS AND OTHER DETERGENTS, *by A. S. T. M. Committee D-12 on Soaps and Other Detergents,* American Society for Testing Materials, Philadelphia, Pa.; 1949; 124 pp., $1.75.

THIS COMPILATION brings together in convenient form for use in industry all the A. S. T. M. standards pertaining to soaps and other detergents. There are 32 specifications and tests giving quality requirements.

Specifications for soap cover the following: bar and various kinds of chip soaps; powdered and salt water soaps; olive oil and palm oil solid soaps; milled, floating and liquid toilet soaps. Specifications for detergents cover: borax; soda ash; caustic and modified soda; sodium bicarbonate, metasilicate and sesquisilicate; trisodium phosphate; tetrasodium pyrophosphate (anhydrous).

Tests and analytical procedures include: sampling and chemical analysis of soaps and soap products and of soaps containing synthetic and alkaline detergents; chemical analysis of sulfonated and sulfated oils and of industrial metal cleaning compositions; determination of particle size of soaps and other detergents; and total immersion corrosion test of water-soluble aluminum cleaners.

Definitions relating to soaps and other detergents are included.

## *Trademarks*

TRADE-MARKS, *by H. Bennett,* Chemical Publishing Co., Inc., Brooklyn, N. Y.; 1949; 479 pp., $10.00.

THIS work by the technical director of Glyco Products Co., Inc., covers the legal and commercial aspects of trade-marks with particular reference to chemicals, chemical specialties and allied products. It contains all the necessary information for registering trade-marks in the U. S. Patent Office, and points out the value of employing an attorney experienced in the field. The outline of principles of trade-mark selection gives four different ways of finding or coining original names. The book also includes a comprehensive list of trade-mark products of value to buyers, sellers, manufacturers, lawyers and others. Much of this has never been published before.

## *Organic Analysis*

ORGANIC QUANTITATIVE ANALYSIS VIA FUNCTIONAL GROUPS, *by Sidney Siggia.* John Wiley & Sons Inc., New York: 152 pp., $3.00. Reviewed by K. S. Konigsbacher, Foster D. Snell Inc.

DR. SIGGIA has filled a need of laboratory analysts and all organic chemists by compiling a series of carefully selected methods of quantitative and semi-quantitative analysis easily adaptable to micro methods. Simple reactions are used, such as determination of an acid, base, oxidant, reductant or gas consumed or liberated, making the book suitable for college courses. The ease with which the author handles the theoretical discussions and the clarity with which he describes all laboratory procedures is highly commendable.

It must be understood, however, that the book is strictly limited in scope, since the given methods are often not within the accepted limits of error, interfered with by other compounds present as impurities, and applicable if only one member of a homologous series is present. It is only supplementary to elementary analysis, particularly in work with high-molecular-weight compounds.

Well written is the chapter on the quantitative separation of components in a mixture; although one might wish the author had gone somewhat into details, such as giving the order of solvents employed in chromatography, methods employing pressure instead of vacuum, and selective adsorption and elution without cutting of the column. Especially for colorless compounds such methods are the only ones leading with certainty to the desired goal.

Too little space, in the opinion of the reviewer, is given to the infra-red spectrometers, which in the last few years have become one of the most important tools of organic analysis.

The explicit drawings are very helpful, leaving no doubts as to the apparatus to be used. Summing up, it may be said that the book reviewed presents a number of carefully checked, but known reactions of organic quantitative analysis which may be of help to the student and the industrial analyst.

## *Reaction*

ENCYCLOPEDIA OF CHEMICAL REACTIONS —VOL. 2, (Cadmium, Calcium, Carbon, Cerium, Cesium, Chlorine, Chromium), *by C. A. Jacobson.* Reinhold Publishing Corporation, New York. Reviewed by Loren C. Hurd, Rohm & Haas Co.

THE SECOND volume of this ambitious work follows the general pattern and plan of volume 1. It contains 3,331 reaction entries, many of which are supplemented with relevant equations and reaction schemes. Not the least valuable portion of the book is an "index to reagents" which, when used in conjunction with the "index to substances obtained," provides ready reference to the subject matter.

The Encyclopedia of Chemical Reactions is the joint work of 118 abstractors and the editor who has systematized and arranged the subject matter. A terse statement regarding major conditions under which the reactions take place preceeds each of the equations cited. Supporting references follow. The value of the Encyclopedia would be enhanced if greater care were taken to cite references to modern work on the various reactions included and if less emphasis were placed upon reports of the past century. Illustrative are the references to the cerous nitrate-sodium pyrophosphate precipitation (1874), mercuric acetylide (1894), cerium trichloride (1895), and the oxidation of hydrocyanic acid with lead dioxide (1838). A surprising number of the references cited are incomplete. Inasmuch as the volume is in reality a guide to the literature the reviewer feels that greater attention to these details will be desirable in forthcoming additions and revisions.

A correction slip for volume 1 is included with volume 2.

**TRIETHYL ORTHOFORMATE** is a unique ester, closely resembling an acetal, stable in the presence of alkali, unstable in the presence of acid, and a source for the ethoxy methylene group

—Potentially valuable in new fields, this compound is now an intermediate for B-complex vitamins, anti-malarials, special polymers and polymethine dyes.

$$HC(OC_2H_5)_3$$

## KAY-FRIES..

# triethyl orthoformate

## AVAILABLE IN CARLOAD QUANTITIES

**KAY-FRIES SPECIFICATIONS**

| | |
|---|---|
| **Purity** | • 99.0% minimum |
| **Specific Gravity** | • .892 - .896 at 20°/20°C |
| **Color** | • Maximum 15 Hazen Scale |

**• Typical reactions of TRIETHYL ORTHOFORMATE •**

$HC(OC_2H_5)_3$ + ROH (ALCOHOL) ➡ $HC(OR)_3 + 3C_2H_5OH$ (TRIALKYL (ARALKYL) ORTHOFORMATE)

$HC(OC_2H_5)_3$ + $RR'C = O$ (CARBONYL COMPOUND) ➡ $RR'C(OC_2H_5)_2 + HCOOC_2H_5$ (ACETAL OR KETAL)

$HC(OC_2H_5)_3$ + $CH_2(CN)_2$ (MALONONITRILE) ➡ $C_2H_5OCH = C(CN)_2 + HCOOC_2H_5$ (ETHOXYMETHYLENE MALONONITRILE)

$HC(OC_2H_5)_3$ + $CH_2CBrHCOOR + H_2$ (ALPHA-BROM-PROPIONIC ESTER) ➡ $(C_2H_5O)_2CHCH(CH_3)COOR + C_2H_5OH + HBr$ (ACETAL OF FORMYL-PROPIONIC ESTER)

$HC(OC_2H_5)_3$ + $C_6H_5COCH_3$ (ACETOPHENONE) ➡ $C_6H_5COC_3H_7 + HCOOC_2H_5 + C_2H_5OH$ (PHENYL PROPYL KETONE)

**TECHNICAL BULLETIN AVAILABLE**

Write or Phone

**American-British Chemical Supplies, Inc.**

Selling Agents For

KAY-FRIES CHEMICALS

KAY-FRIES CHEMICALS, INC.

180 Madison Ave., New York 16, N. Y. MUrray Hill 6-0661

## *Dye Processes*

FUNDAMENTAL PROCESSES OF DYE CHEMISTRY, *by Hans Eduard Fierz-David and Louis Blangey*, Eidgenossiche Technische Hochschule, Zurich. Interscience Publishers, 1949, 511 pp., 57 illustrations, 24 tables, $9.50. Reviewed by L. H. Flett, National Aniline Division, Allied Chemical & Dye Corp.

THE BOOKS published by Hans Eduard Fierz-David and his collaborator have been standards in the dyestuff industry since the first edition was published in 1922. It is very convenient to have the present fifth edition translated into English.

This publication provides the foundation necessary for the beginner who plans to enter the commercial field of dyes and intermediates. He can well afford to read this book from cover to cover and then to keep it on his bookshelf within easy reach. Even the experienced dyestuff worker will find it handy for ready reference.

Originally directed to practical methods of making dyes and intermediates, it has been expanded to cover all of the phases of dyestuff manufacture which the research worker might encounter. It is replete with homely and valuable advice for the beginner. There is no point at which the edition attempts to exhaustively cover any one field of dye chemistry. Rather it seeks to exemplify briefly all of the commercially interesting branches. The book discusses the manufacture of dyes and intermediates in the laboratory and the plant. There is a discussion of the unit processes and the equipment required. Brief illustrative descriptions of the preparation of many of the more common intermediates and dyes are given. The section on azo dyes is particularly well done. Control analysis, cost calculations, materials of construction and management are discussed, all of which are of great interest to the industrial research worker in this field.

The expanded sections on the analysis of commercial dyes and the determination of lightfastness both fall far short of the exacting descriptions available in other publications, but here again they should be read by the beginner so that he may be better prepared to understand the more advanced treatises.

The tables at the end of the book showing the derivation of intermediates will be particularly helpful to those who wish to keep track of the many intermediates used in the dyestuff field.

It is to be hoped that the authors will continue their efforts in keeping their book up with rapidly advancing trends of organic chemistry and with the many new processes being introduced into the dyestuff industry. References indicate that the present book is drawn largely from the German literature. Future editions should recognize the more recent advances in England and the United States as sources of instructive material.

## *Other Publications*

TRILINEAR CHART OF NUCLEAR SPECIES, by William H. Sullivan, packs much information about all known isotopes of the elements in a novel, convenient chart arrangement. John Wiley & Sons, New York, $2.50.

COMMERCIAL CHEMICAL DEVELOPMENT and Marketing Research, a bibliography of publications by General Mills Research Laboratories, 2010 E. Hennepin Ave., Minneapolis 13, Minn., an 8-page Mimeographed report available on request to Mr. M. H. Baker.

HOT-TINNING, by W. E. Hoare, provides complete working instructions for producing hot-tinned coatings. 112 pp., free upon request to Tin Research Institute, 492 W. 6th Ave., Columbus 1, O.

MOLECULAR INTERACTION, a 280-p. symposium published by the New York Academy of Sciences, Central Park W. at 79th St., New York 24, N. Y., $4.00.

ANNUAL REPORTS on the Progress of Chemistry, 1948, published October, 1949, by the Chemical Society, Burlington House, Piccadilly, London, W. 1., £1.5s. Od.

SCIENTIFIC AND TECHNICAL ABBREVIATIONS, Signs & Symbols, 2nd ed., by Zimmerman and Lavine, $8.00 domestic. Industrial Research Service, Masonic Bldg., Dover, N. H.

COMMERCIAL LIGNINS, 23 pp., Bulletin No. 29, $100, Northeastern Wood Utilization Council, P. O. Box 1577, New Haven 6, Conn.

SYNTHETIC DETERGENTS—Up TO DATE, by John W. McCutcheon, 475 5th Ave., New York 17, N. Y., 36 pp., $1.00.

CHEMISCHES ZENTRALBLATT, published by Verlag Chemie, GmbH, Weinheim/Bergstr., Germany, will be issued in its old form starting this year, instead of in two issues.

### *Films*

TALE OF THE POWDERED PIG, 30 min., 16 mm., sound, color, shows manufacture and uses of aluminum powders and pastes. Reynolds Metals Co., Motion Picture Dept., 821 S. 12th St., Louisville 1, Ky.

Technical and Nontechnical Translations In All Languages

Technical Publications and Documentary Research

**Our New Home**

Our Circular Letter No. 25 covering FORTY-ONE of our latest technical publications translated from both German and Russian into English in the PETROLEUM and CHEMICAL fields, has just been mailed to over 3000 of our active accounts. Have you received your copy? If not, you may obtain a copy upon request. You are under no obligation or expense in requesting same as it is always our pleasure to be of service.

*Please note our new address*

**CHARLES A. MEYER & ASSOCIATES, INC.**

NYACK, NEW YORK Upper Nyack-on-the-Hudson Telephone Nyack 7-0033

# Does your plant use surface active agents?

IF SO, investigate the ULTRAWETS—the family of alkyl aryl sulfonates tailor-made for particular jobs. Available in liquid, flake or bead form. We are confident that one of the ULTRAWETS will suit your needs—probably more efficiently or more economically than the product you now use.

**INDUSTRIAL AND HEAVY DUTY DETERGENTS**—High density ULTRAWET SK and ULTRAWET K are outstanding for dry mixing with builders.

**TEXTILE DETERGENTS**—Liquid ULTRAWET 35KX is the most economical alkyl aryl sulfonate for volume use. Flake ULTRAWET K or bead ULTRAWET SK are suggested where dried products are desired.

**WETTING AGENT OR PENETRANT**—The liquid ULTRAWET 30E, ULTRAWET 30DS or ULTRAWET 60L offer a diversified choice of wetting, penetrating, foaming and solubility characteristics. ULTRAWET DS is available if you prefer a dry product.

**LIGHT DUTY DETERGENT**—ULTRAWET SK is the product for this use—no builders are necessary.

**LIQUID HOUSEHOLD DETERGENT**—ULTRAWET 60L is outstanding because of its sudsing and solubility properties.

Regardless of your use, our technically trained salesmen with broad experience in the field can no doubt help you. We'd like to hear from you. The Atlantic Refining Company, Chemical Products Section, 260 S. Broad Street, Philadelphia 1, Pa.

**ATLANTIC**

**PETROLEUM CHEMICALS**

*In the East*
**THE ATLANTIC REFINING COMPANY**
Philadelphia • Pittsburgh • Providence
Charlotte • Chicago

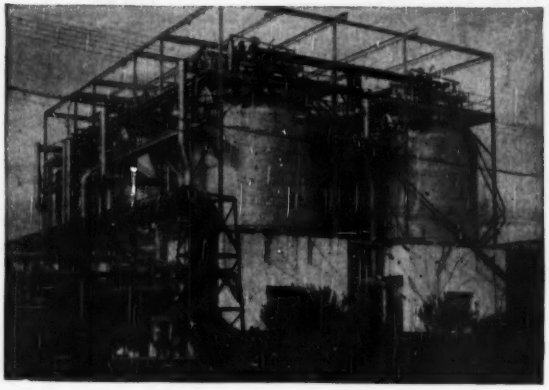
*On the West Coast*
**L. H. BUTCHER COMPANY**
San Francisco • Los Angeles • Seattle
Salt Lake City • Portland • Oakland

*In Canada*
**NAUGATUCK CHEMICALS**
*Division of Dominion Rubber Co., Ltd., Canada*
Elmira • Montreal • Toronto • Windsor
Winnipeg • Saskatoon • Calgary

# SULPHUR

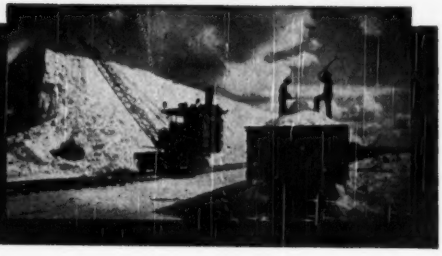
*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

## *SUPERHEATED WATER . . .



Mining operations are most successfully carried out if the water pumped into the sulphur deposit is heated under pressure to a temperature of about 320° F. For large scale mining, enormous quantities of water are required, so, a primary requisite is an adequate supply of suitable water and an efficient power plant in which to heat it.

To insure a continuous supply of water at Newgulf, it is the practice to use river water pumped in time of flood or full flow and stored in large reservoirs. This supply is supplemented, when necessary, with well water. Water so obtained is seldom suitable for use in boilers or mine water heaters without being treated first because of natural salts in solution. Softening by chemical treatment is necessary to prevent deposition of scale on boiler tubes and hot water lines.



Loading operations at one of the huge vats of Sulphur at our Newgulf, Texas mine. Such mountains of Sulphur are constantly being built at our mines, from which shipments are continually made.

**TEXAS GULF SULPHUR CO. INC.**

**75 East 45th St. New York 17, N. Y.**

**Mines: Newgulf and Moss Bluff, Texas**

# . . . To Help You

LATEST manufacturers' booklets and bulletins on products, processes, and equipment . . . Fill out and send the postpaid card for your free copies.

## Chemicals

**Aluminum Soaps** ..... C120

"Aluminum Soaps for Lubricating Grease Manufacture" contains descriptions of major gel-forming aluminum stearates and discusses manufacturing techniques, the advantages of using combinations of aluminum soaps, method for laboratory evaluation of greases, and common grease plant troubles. Aluminum Stearate Technical D-50, Mallinckrodt Works.

**Emulsion Mud** ..... C121

6-p. booklet describes composition, mixing, maintenance and control of properties of stable oil emulsion drilling fluid. Also, 7-p. bulletin lists distributors of Baroid products. Baroid Sales Div., National Lead Co.

**Vinyl Butyral Resins** ..... C122

22-p. booklet describes properties and application of vinyl butyral resins. Discussion of wash primer type of metal conditioner formulations and table on compatibility of vinyl butyral resins included. Technical Release No. 11, Bakelite Corp.

**Reagents** ..... C123

Bulletin lists industrial laboratory reagents, A.S.T.M., A.O.A.C., and A.P.H.A standards; Karl Fischer reagent; and indicator solutions available from Laboratory Reagents Co.

**Dry Cleaning Detergents** ..... C124

2-p. bulletin entitled "Some Frank Questions and Answers About the Alrolenes" includes information on advantages and use of Alrolenes. Alrose Chemical Co.

**Solvents** ..... C125

8-p. booklet gives specifications for about 40 petroleum solvents, both aliphatic and aromatic. Table of uses of various solvents and comparative evaporation chart included. American Mineral Spirits Co.

**Solvents and Solvent Oils** ..... C126

6-p. bulletin describes characteristics and gives typical analyses and uses of Picco aromatic petroleum naphthas, coal tar naphthas, heavy naphthas, coal tar heavy naphthas, solvent oils and heavy solvent oils. Pennsylvania Industrial Chemical Corp.

**Calcium Chloride for Fire Prevention** . . . C127

23-p. booklet describes value of calcium chloride as a non-freezing, non-evaporating and non-fouling solution for many types of emergency fire fighting equipment. Solvay Sales Div., Allied Chemical and Dye Corp.

**Formaldehyde** ..... C128

30-p. booklet contains information on specifications, physical properties, uses, methods of analysis, storage and handling, and unloading of formaldehyde. Celanese Corp. of America.

**Textile Finishing** ..... C129

Bulletin P-5 describes formulas and finishing procedures, methods of application, and characteristics of finish imparted of ten Polysize emulsions for compounding finishes for cotton, rayon, silk, nylon and linen. American Polymer Corp.

**Chemicals** ..... C130

120-p. booklet, Collective Volume I, contains complete technical data on 17 new products of New Product Development Dept., American Cyanamid Co.

**Anti-Precipitating Agents** ..... C131

Booklet describes use of anti-precipitating agents for prevention of scale, deposits and corrosion in cooling systems, service water lines, etc. Flow chart of typical plant cycle included. Power Chemicals Div., E. F. Drew & Co., Inc.

**Choline Chloride** ..... C132

8-p. booklet describes use of choline chloride as an ingredient in livestock and poultry feeds. Nomograph by which the amount of choline required to raise the choline content of a ration to any desired level included. Commercial Solvents Co.

**Polyvinyl Acetate** ..... C133*

2 bulletins survey the industrial application of polymeric and copolymeric vinyl acetates. Bulletin P-16, "Polyvinyl Acetate Emulsions," includes data on theory of emulsions, properties, compounding, uses and storage and handling; Bulletin P-15, "Polyvinyl Acetate Solutions," contains a review of the forms, properties and uses of polyvinyl acetate at high concentration in a variety of solvents. American Polymer Corp.

**Chemicals** ..... C134

Catalog describes 200 new chemicals that show promise of commercial development. Chemicals described are in semiplant production. Dow Chemical Co.

**Chromium Chemicals** ..... C135*

32-p. booklet describes general use and various applications of chromium chemicals. Charts and tables on equivalent weights, conversion formulas, and tank capacities included. Diamond Alkali Co.

**Disinfectants** ..... C136

14-p. bulletin describes formulations and properties of mono-tert-butyl-meta-cresol disinfectants. Bulletin C-9-130-1, Chemical Division, Koppers Co., Inc.

**Surface Active Agents** ..... C137*

2 data sheets describe properties and use of a concentrated surface-active agent and a low cost wetter. M. Michel and Co., Inc.

**Kaolin Clays** ..... C138*

144-p. book, "Kaolin Clays and Their Industrial Uses," describes the technology of producing, refining, testing and using kaolin clays, and is intended as a standard reference. 75 photographs and charts and 49 tables included. J. M. Huber Corp.

**Waxes** ..... C139

4-p. bulletin describes properties, specifications and uses of special waxes. Barco Oil Co.

**Nitrocellulose Packaging** ..... C140

32-p. booklet describes formulations and materials used for packaging and paper lacquers. Paper coating properties of various resins and plasticizers discussed. Hercules Powder Co.

**Hydrides** ..... C141

4-p. folder discusses applications and properties of metallurgical and chemical hydrides. Metal Hydrides, Inc.

## Equipment

**Valves** ..... K181

4-p. bulletin describes dimensions and advantages and diagrams corrosion resistant jacketed valves. Alloy Steel Products Co.

**Metal Powders** ..... K182

4-p. bulletin describes uses and features of iron, steel, nickel, manganese and silicon powders. Bulletin No. 567, Plastics Metals Div., The National Radiator Co.

**Crane Scale** ..... K183

4-p. bulletin describes operation and application of hydroscale which weighs load as it lifts. Diagram included. Hydroway Scales, Inc.

**Pumps** ..... K184

4-p. bulletin completely diagrams and gives specifications for constant and variable delivery pumps. Superdraulic Corp.

**Plates and Films** ..... K185

8-p. booklet describes special sensitized plates and films for laboratory work. Descriptions of emulsions available for spectrographic work, photomicrography and nuclear track studies included. Industrial Photographic Div., Eastman Kodak Co.

**Titrator** ..... K186

4-p. bulletin describes operation and features of automatic titrator. National Technical Laboratories.

## CHEMICAL INDUSTRIES TECHNICAL DATA SERVICE

**I would like to receive the following free booklets and catalogs. (2-0)**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| C120 | C130 | C140 | K189* | K199 | K209 | K219 | K229 |
| C121 | C131 | C141 | K190 | K200 | K210 | K220 | K230 |
| C122 | C132 | K181 | K191 | K201 | K211 | K221 | K231 |
| C123 | C133* | K182 | K192 | K202 | K212 | K222 | K232 |
| C124 | C134 | K183 | K193 | K203 | K213 | K223 | |
| C125 | C135* | K184 | K194 | K204 | K214 | K224 | |
| C126 | C136 | K185 | K195 | K205 | K215 | K225 | |
| C127 | C137* | K186 | K196 | K206 | K216 | K226 | |
| C128 | C138* | K187 | K197 | K207 | K217 | K227 | |
| C129 | C139 | K188 | K198 | K208 | K218 | K228 | |

* Inquiry must be made on business letterhead.

Name ..... (Position) .....

Company .....

Street .....

City ..... Zone ..... State .....

**Liquid Level Control** ..... K187

24-p. catalog describes operation and applications of magnetic tape and drum, electronically transmitting, ball-float, pneumatic and differential pressure units; V-notch weir and Parshall flume flowmeter instruments; and chemical service sight gauge glasses. Fischer & Porter Co.

**Ventilators** ..... K188

2-p. bulletin describes and gives specifications for portable ventilators. Bulletin No. CU-2, Mine Safety Appliances Co.

**Heating Mantles** ..... K189

Bulletin No. 4 describes details of construction and operation of over 50 types of heating mantles. Glas-Col Apparatus Co.

**Diesel Engines** ..... K190

20-p. bulletin, No. 4812, describes and illustrates diesel engines for stationary installations. Over 100 engine specifications included. Superior Engine Div., The National Supply Co.

**Insulation Testers** ..... K191

7-p. bulletin describes principle of operation, dimensions and specifications for rectifier- and dual-operated insulation testers. Bulletin 21-46. James G. Biddle Co.

**Motor** ..... K192

4-p. bulletin describes advantages and specifications of sanitary motor which can be hosed down. U. S. Electrical Motors, Inc.

**Manometers** ..... K193

4-p. bulletin describes improvements in and specifications of King Manometer. King Engineering Corp.

**Water Heater** ..... K194

8-p. folder describes advantages and operation of automatic, self-heating, white water heater. Diagram and specifications included. Bulletin No. 190, Davis Engineering Corp.

**Swivel Joints** ..... K195

Catalog No. 50 describes over 500 types and sizes of ball-bearing swivel joints. Also included are descriptions of all-steel rotary hose, all-metal marine and barge hose, all-steel cementing and circulating hose, circulating heads and mud guns. Chiksan Co.

**Boiler Water Treatment** ..... K196

Booklet describes methods required to assure complete water treatment. Power Chemicals Div., E. F. Drew & Co., Inc.

**Air Conditioning** ..... K197

2-p. bulletin describes and diagrams controlled humidity method of air conditioning. Bulletin No. 112, Niagara Blower Co.

**Casters** ..... K198

2-p. bulletin describes features and gives specifications for casters for various uses. Roll-Rite Corp.

**Calenders** ..... K199

4-p. bulletin describes construction features and applications for calenders. Farrel-Birmingham Co.

**Acidity Test Kit** ..... K200

3-p. bulletin describes kit for testing acidity of oil in the field. Bulletin No. 70, The Gerin Corp.

**Boiler** ..... K201

Bulletin A-104 describes gas-fired Scotch steam pack boiler. Eclipse Fuel Engineering Co.

**Gloves** ..... K202

4-p. bulletin describes and gives specifications for industrial and acid gloves. Bulletin No. 9035, B. F. Goodrich Co.

**Valve** ..... K203

2-p. bulletin describes, diagrams and gives dimensions for stainless steel valve. Ketchpel Engineering Co.

**Pipe and Fittings** ..... K204

8-p. catalog section gives design, construction and service recommendations for rubber-lined pipe, fittings and valves. No. 9780, B. F. Goodrich Co.

**Load Cell** ..... K205

2-p. bulletin describes compression SR-4® load cells. Specifications include physical dimensions, electrical data, overload characteristics, effects of sustained and impact loads, etc. Bulletin No. 307, The Baldwin Locomotive Works.

**Lift Truck** ..... K206

8-p. booklet describes and diagrams 2,000 pound capacity lift truck. Specifications and details included. Bulletin No. 1135, Hyster Co.

**Steam Jet Ejectors** ..... K207

18-p. catalog describes and diagrams steam jet ejectors for high vacuum. Data on construction, specifications and application included. Croll-Reynolds Co.

**Rubber Linings** ..... K208

6-p. catalog sections describes B. F. Goodrich process for locking rubber to metal, discusses materials used in various types of standard linings and recommended uses. Tables showing which acids can be safely handled by rubber linings and storage tank dimensions included. No. 9020, B. F. Goodrich Co.

**Heaters** ..... K209

4-p. booklet describes advantages and gives storage and heating capacities for hot water storage heaters. Patterson-Kelley Co.

**Leak Detector** ..... K210

16-p. catalog describes operation, performance, features and applications of leak detector. Section on leak detection methods used in vacuum and pressure systems included. Consolidated Engineering Corp.

**Multi-layer Vessels** ..... K211

6-p. bulletin describes features of multi-layer vessels and their manufacture and assembly. A. O. Smith Corp.

**Shaft Sleeve Bearing Units** ..... K212

Bulletin 110 gives complete engineering data on parallel shaft sleeve bearing speed reducers. Falk and Co.

**Pressure Cells** ..... K213

2-p. bulletin describes and gives specifications for SR-4® resistance wire strain gage type pressure cells of eight capacities. Bulletin 306 The Baldwin Locomotive Works.

**Indicating Instruments** ..... K214

10-p. bulletin describes advantages and construction of electrical indicating instruments. Marion Electrical Instrument Co.

**Vibrating Machine** ..... K215

4-p. bulletin describes advantages and construction features of heavy duty vibrating machine. Bulletin No. 131, Hewitt-Robins, Inc.

**Steel Alloys** ..... K216

4-p. bulletin describes features and physical characteristics of electro steel alloys. Uniworld Research Corp. of America.

**Belting** ..... K217

6-p. bulletin gives widths and recommended uses for conveyor belting. Buffalo Weaving and Belting Co.

**Hose** ..... K218

2 catalog sections, Nos. 4440 and 4780 describe advantages and applications of sand blast hose and industrial vacuum hose. B. F. Goodrich Co.

**Compressors** ..... K219

16-p. bulletin describes features and construction details of compressors. Selector chart and section drawings included. Joy Manufacturing Co.

**Ring Balance Meters** ..... K220

4-p. bulletin discusses how ring balance meters provide automatic compensation for pressure or temperature varitaions in flow measurement of gases or liquids. Diagrams included. Bulletin M-51, Hagan Corp.

**Sprockets** ..... K221

16-p. bulletin describes dimensions, specifications and prices for cast sprockets. Bulletin No. 49-30. Chain Belt Co.

**Froth Flotation** ..... K222

4-p. bulletin by L. A. Roe discusses varies froth flotation problems and uses of froth flotation. Denver Equipment Co.

**Cylinders** ..... K223

28-p. bulletin describes features, diagrams and gives specifications for hydraulic coil cylinders. Bulletin No. 49-55, Vickers, Inc.

**Salt Descaling** ..... K224

8-p. bulletin describes application, features, equipment and operation of Virgo salt descaling process. Bulletin 25, Hooker Electrochemical Co.

**Safety Sign** ..... K225

1-p. bulletin describes Flash-O-Graph moving light for safety messages. Mine Safety Appliances Co.

**Liquid Chlorine Chart** ..... K226

Wall chart on accident prevention and safety measures to be followed in the handling of liquid chlorine. Heavy Chemicals Div., Pennsylvania Salt Mfg. Co.

## *Companies*

**Union Carbide and Carbon Corp.** ..... K227

"Products and Processes" describes the principal activities of Union Carbide's five major groups: alloys and metals; chemicals; electrodes, carbons, and batteries; industrial gases and carbide; and plastics.

**Consulting and Research Services** ..... K228

Bulletins to be issued regularly describing the consulting and research services of the Research and Development Division, Henry W. Lohse.

**Skinner and Sherman, Inc.** ..... K229

6-p. folder describes services of Skinner and Sherman, Inc.

**General Aniline and Film Corp.** ..... K230

16-p. booklet describes products and facilities of General Aniline and Film Corp.

**Owens-Corning Fiberglas Corp.** ..... K231

32-p. booklet describes facilities and procedures employed in the testing laboratories of Owens-Corning Fiberglas Corp.

**Armour Research Foundation** ..... K232

4-p. bulletin describes services and equipment of Engine Research Laboratory, Armour Research Foundation.

Postage Will be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

**BUSINESS REPLY CARD**

First Class Permit No. 4288, Sec. 510, P. L. & R., New York, N. Y.

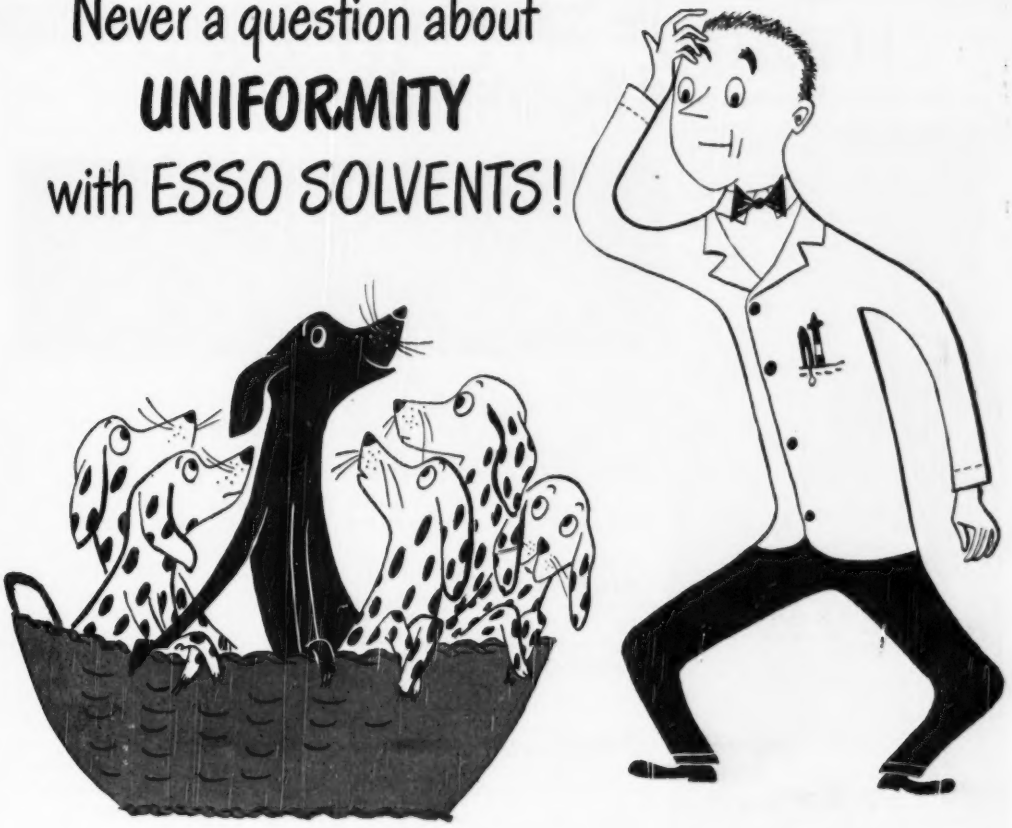
Technical Data Service

**CHEMICAL INDUSTRIES**

309 W. Jackson Blvd.

Chicago 6, Illinois

# Never a question about **UNIFORMITY** with ESSO SOLVENTS!



**EXACTING** modern refining treatments give Esso Solvents closely controlled uniformity for better processing. Esso Petroleum Solvents are being used more and more in such industries as paint . . . textiles . . . rubber . . . chemicals . . . food packaging . . . leather . . . many others — where uniformity is required.

**INDUSTRIAL USERS** *know* they can depend on Esso Solvents for purity and uniformity!

## YOU CAN DEPEND ON ESSO SOLVENTS FOR

- **UNIFORMITY** — made in modern refineries from carefully selected crude oil sources.
- **ECONOMY** — closely-controlled quality gives constant, efficient industrial processing, high-quality products.
- **CONTROLLED EVAPORATION** — available in a wide range of evaporation rates with precise characteristics to meet your requirements.
- **SOLVENCY** — Esso aliphatics and Solvesso aromatics cover both high and low solvency ranges.
- **MODERN HANDLING METHODS** — separate tank storage, pumping lines, tank cars and trucks, are used in all Esso Solvent handling operations. Prompt, efficient delivery to your door is assured.
- **MULTI-STORAGE AVAILABILITY** — Water terminals in industrial centers.

*Controlled high quality helps produce larger profits with versatile, dependable Esso Solvents.*

**ESSO PETROLEUM SOLVENTS**

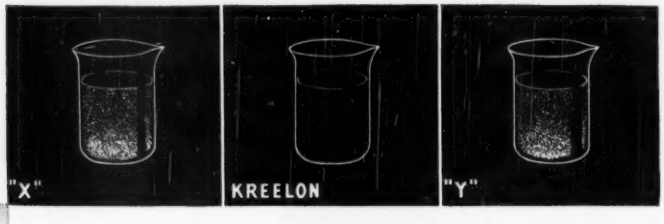
**SOLD IN** Me., N. H., Vt., Mass., R. I., Conn., N. Y., N. J., Pa., Del., Md., D. C., Va., W. Va., N. C., S. C., Tenn., Ark., La.

**ESSO STANDARD OIL COMPANY** — Boston, Mass. — New York, N. Y. — Elizabeth, N. J. — Philadelphia, Pa. — Baltimore, Md. — Richmond, Va. — Charleston, West Va. — Charlotte, N. C. — Columbia, S. C. — Memphis, Tenn. — Little Rock, Ark. — New Orleans, La.

### FOR TECHNICAL ASSISTANCE

If you have a solvents problem or want further information on the specifications and characteristics of Esso Solvents—write or call our office nearest you. Our technicians will be glad to assist you.

# The "solution test" proves another advantage of Wyandotte Kreelon



***Lighter color***

Guaranteed detergency

Free-flowing flakes or powder

No objectionable odor

Maximum detergency

Because appearance and performance are important factors in your detergent applications, it will pay you to make the "solution test."

Take a sample of *Wyandotte Kreelon** and one or a number of other detergents. Simply dissolve in a given quantity of water. You'll find that most detergents will turn hazy or "muddy." The Kreelon solution, on the other hand, is clear—practically colorless.

Kreelon also dissolves faster and has greater solubility than most other detergents. And it is uniform in *performance* as well as *appearance*. It provides excellent sudsing and soil removal properties, maximum whiteness retention. Kreelon contains a minimum of 40% active agent.

For further information on Wyandotte Kreelon, its properties and applications, just fill in the coupon below and mail it today.

*Reg. U. S. Pat. Off.

SODA ASH • CAUSTIC SODA
BICARBONATE OF SODA
CALCIUM CARBONATE • CALCIUM CHLORIDE
CHLORINE • HYDROGEN • DRY ICE
SYNTHETIC DETERGENTS • GLYCOLS
CARBOSE (Sodium CMC) • ETHYLENE DICHLORIDE
PROPYLENE DICHLORIDE
AROMATIC SULFONIC ACID DERIVATIVES
OTHER ORGANIC AND INORGANIC CHEMICALS

**Wyandotte Chemicals Corporation**
Wyandotte, Michigan • *Offices in Principal Cities*

Wyandotte
REG. U. S. PAT. OFF.

**To: WYANDOTTE CHEMICALS CORPORATION, Wyandotte, Michigan**
Please send your literature on Wyandotte Kreelon to:

Name _____
Firm _____
Address _____
City _____ State _____

# NEWS OF THE MONTH

## *New Construction*

• **Industrial building costs** will probably remain at current levels. Nominal advances in some material prices and labor rates should be offset by improved labor efficiency and more rapid completion of contract work. Quarterly index of industrial building costs of The Austin Co. remained fixed at 161 at year's end (1926=100) despite steel price rise.

• **A new methanol production unit** has begun operation at the Texas City, Tex., plant of Carbide and Carbon Chemicals Division, Union Carbide and Carbon Corp. Addition of these facilities is part of the company's long-range expansion program. The new unit more than doubles the combined methanol production of the company's Niagara Falls, N. Y., and South Charleston, W. Va., plants.

• **A new liquid sulfur dioxide plant** with a daily capacity of 25 tons is being built by Tennessee Copper Co. at Copperhill, Tenn. It is expected to be in operation early this year.

• **Expansion of the Du Pont Co.'s** Chattanooga, Tenn., nylon plant will cost about $1.5 million, according to a report of a county building permit in *Hurst Construction News*.

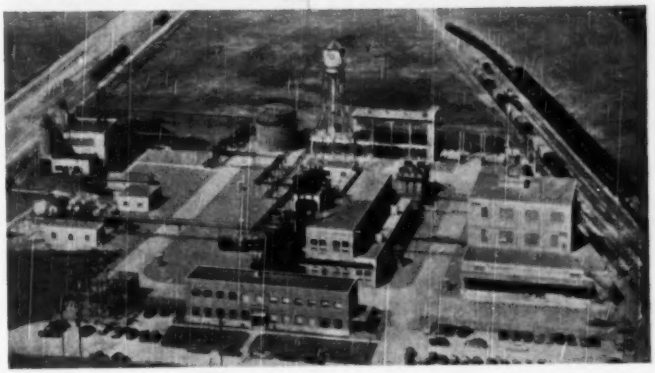
• **Macbeth Corp.** has moved into its new plant at Newburgh, N. Y., where all manufacturing activities as well as executive and general offices will now be located. The larger quarters will permit expansion of manufacturing and research facilities.

• **A $100,000 modernization** program **that will triple its production capacity** will be undertaken by Perlite Manufacturing Co., Carnegie, Pa. Work includes installation of conveyor systems, bins, and an additional furnace to process company's lightweight building aggregate Perlite.

• **A new asphalt tile laboratory** was recently put into service at the Edgewater, N. J., Applications Research Laboratory of The Barrett Division, Allied Chemical & Dye Corp. Including mills and other equipment as well as complete facilities for physical testing, it is available to the asphalt tile industry in solving problems relating to both the manufacture and testing of tile.

## *Ownership Changes*

• **United States Rubber Co.** got into vinyls and The Glenn L. Martin Co. got out of the chemical business with the former's recent purchase of the latter's chemicals division. With it went all assets of the division, including the Marvinol vinyl resin plant at Painesville, O.—third largest vinyl plant in the country—laboratory equipment in Baltimore, patents and trade name Marvinol.



*Air view of Marvinol vinyl resin plant at Painesville, O., purchased by U. S. Rubber Co. from The Glenn L. Martin Co.*

Naugatuck Chemicals division of the rubber company will handle the new business. The plant, built in 1947, has nine buildings, currently employs 200 people, is said to be the most modern of its type. (See cut.)

• **Falk & Co.,** Pittsburgh, Pa. oil manufacturer and processor, has acquired the more than 4-acre Philadelphia plant of Bisbee Linseed Co. Crushing capacity is 2½ million bushels of grain; refining and processing equipment can produce 2 tank cars of oil a day. A modernization program is already in the works for the newly acquired plant.

## *General*

• **Commercialization** of coal to gasoline processes is still a long way off. Pittsburgh Consolidation Coal Co. and Standard Oil Development Co. have ceased operations at the large gasification pilot plant they have run continually for for over 13 months at Library, Pa. Reasons: uncertainty of regular and cheap coal supply that is a must for a commercial plant (John L. Lewis again); adequate supplies of crude petroleum are now available and a more normal increase in demand has returned.

It wasn't wasted effort, however. Much valuable information on application of fluidized solids technique to gasification of both coal and coke has been developed, representing a substantial advance toward commercial design for production of fuel or synthesis gas from coal on a large scale.

• **A plea of innocent** was entered last month by J. T. Baker Chemical Co., Phillipsburg, N. J., when it was indicted in Buffalo, N. Y., on a Federal charge of violating Interstate Commerce Commission safety regulations in the Holland Tunnel explosion of last May 13.

## *Washington*

• **The Atomic Energy Commission** has named nine chemical distributing companies to market commercial uranium and has granted eight new licenses for its use. Sales will be restricted to qualified licensees at the standard price of $50 a pound. New distributors include the following: Eimer & Amend, New York; A. D. Mackay, New York; J. T. Baker Chemical Co., Phillipsburg, N. J.; Fisher Scientific Co., Pittsburgh; The Braun Corp., Los Angeles; Braun-Knecht-Heimann Co., San Francisco; Mallinckrodt Chemical Works, St. Louis; Central Scientific Co., Chicago; and E. H. Sargent Co., Chicago.

• **With private plants** now expected to be in a position to supply the Army's fertilizer needs for occupied areas, the Army is winding up its fertilizer program begun in October, 1946. Facilities scheduled for closing early this month include fertilizer units at Ravenna Arsenal, Apco, O.; Iowa Ordance Plant, Burlington, Ia.; and Joliet Arsenal, Joliet, Ill. April closings are scheduled for Indiana Arsenal, Charlestown, Ind.; Illinoil Ordnance Works, Carbondale, Ill.; San Jacinto Ammonia Works, Houston, Tex.; Ohio River Ordnance Works, Henderson, Ky. and Morgantown Ordnance

Works, Morgantown, W. Va. Fertilizer facilities at Nebraska Ordnance Plant, Wahoo, Neb., were closed last December.

Ohio River Ordnance Works will be offered for sale. Facilities at Illinois Ordnance Works will revert to Dept. of Interior. Other plants will be retained by the Army as standby facilities, but can be leased for commercial purposes.

• **The Government's** Coal Hydrogenation Demonstration Plant at Louisiana, Mo., has completed a continuous 7-week "break-in" run in which coal tar oil and Wyoming coal were converted to gasoline and other liquid fuels. This is the first time substantial quantities of oil have been made from such materials by hydrogenation in this country, Secretary of the Interior Oscar L. Chapman pointed out in his report on the project.

• **In a plan** to make information on bids on military contracts widely available, the U. S. Dept. of Defence is designating approximately nine major cities as central distribution points for information on all formal bid requests issued by the three services. Cities have not been finally selected but will be located to ensure adequate geographical distribution of information.

A synopsis of bids issued each day will give a businessman sufficient information about material to be purchased to enable him to decide whether he wants to make a bid.

***Roy B. Johns (left), elected a vice-president of Freeport Sulphur Co., and Sanford M. Wagner, elected vice-president in charge of sales of Ethyl Corp. Mr. Johns has been assistant vice-president and sales manager of Freeport. Mr. Wagner has headed Ethyl's Western Region sales operations.***

## *New Companies*

• **Production** of specialty monomers will be the activity of recently organized American Monomer Corp., 41 Mount Vernon St., Boston, Mass. Sixteen said to never have been available from a single source previously, are now in production, and several more will be added. Custom synthesis of any not regularly produced will be part of the service. At present only laboratory quantities are being sold, but some are available in pilot plant quantities and production can be expanded to carload lots if necessary.

• **Emtec Research Laboratories** has been organized in Stamford, Conn. by Samuel Machlis and Edwin B. Michaels, formerly co-directors of a product testing and institutional research program carried on for American Hotel Association by York Research. The new organization will both test and develop products.

• **A new export company,** Sharp & Dohme Interamerican Corp., has been organized as a wholly-owned subsidiary of Sharp & Dohme Inc., to transact its export business in Puerto Rico and Argentina. S&D operations in other countries of the western hemisphere may be added in the near future.

• **Leon Jasper,** former sales manager of Chemical and Process Machinery Corp., has organized his own company for the sale and purchase of both new and used equipment for chemical, drug, cosmetic and allied industries. He is located at 1123 Broadway, New York, N. Y.

• **Paul Blum,** formerly manager of the chemical department of Alan D. Oppenheimer, Inc. has set up his own organization and is now doing business in industrial chemicals and by-products as Paul Blum and Co. The plant and offices are at 315 Larkin St., Buffalo 10, N. Y.

## *Foreign Developments*

• **The Canadian Bank of Commerce** index of industrial activity reports chemicals as utilizing 115% of current capacity in November and October 1949, the same as was reported for November 1948. This was 145% of general 1937 activity for November and October 1949, as contrasted with November 1948 ,which was 134% of general 1937 activity.

• **Dewey and Almy Co.** plans to open a plant in Epernon, near Paris, France, to produce can sealing compounds and other products. A subsidiary, to be called Darex S. A. R. L., in which Dewey and Almy has 51% of the stock, has been set up to operate the plant, expected to start next summer. The French government has given its approval.

• **The opening of a chemical plant** at Pernis, Rotterdam, by Bataafsche Petroleum Maatschappij, operating company of the Royal Dutch/Shell Group, gives Holland a new source of petroleum-based chemicals. One section will produce synthetic detergents and the other, polyvinyl chloride.

## *Company Notes*

• **Distillation Products, Inc.,** the wholly-owned subsidiary of Eastman Kodak Co., has been dissolved as a separate corporation and become a divi-


# GERSTHOFEN WAXES

**(FORMERLY I. G. WAXES)**

**. . . became so popular before the war that their return to this market is of great importance. These high melting, hard waxes produce lustrous films of excellent durability. They are unsurpassed in the manufacture of polishes, carbon paper and the many fields where their unique qualities may be utilized. Colors range from light yellow to dark brown.**

***Distributed thru***

## George H. Lincks, Inc.

155 John Street
New York 7, N. Y.

# Yours FOR THE ASKING... write now!

This 32-page book alphabetically lists all chemicals available through Harshaw, relates the history of the Company and describes Harshaw's major activities. Write for a copy.

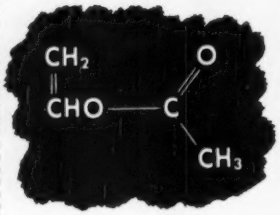
THE HARSHAW CHEMICAL CO.
1945 East 97th Street, Cleveland 6, Ohio
BRANCHES IN PRINCIPAL CITIES

# NIACET

Trade Mark

## UNPOLYMERIZED VINYL ACETATE

(STABILIZED)




**BOILING RANGE**
**71.8° to 73°C.**

Vinyl Acetate can be polymerized to form resins with exceptional bonding qualities for wood, glass, metal and fibre.

Vinyl Acetate can be used for synthesis of a-b-dichloroethyl acetate, b-monochlor ethyl acetate, b-chloro acetals, 2-aminothiazole, chloroacetaldehyde and many others.

***Containers: —***

**410 lb. drums**

**62,500 lb. tank cars**

*For further information write to:*

**NIACET**
**CHEMICALS DIVISION**
UNITED STATES VANADIUM CORPORATION
Unit of Union Carbide and Carbon Corporation

***Sales Offices:***

**922 Niagara Bldg. • Niagara Falls, N. Y.**


sion of the parent company. It will be known as the Distillation Products Industries division, and will thus retain the initials DPI. The Eastman organic chemical sales division of Eastman Kodak has also been transferred to the new division. It will be known as Eastman organic chemicals department of Distillation Products Industries.

• **A commercial ultrasonic** testing service for metals-producing, -processing, and -fabricating plants, and for maintenance inspection, has been established by Sperry Products, Inc., Danbury, Conn.

• **All drying oil sales** activities at the Minneapolis office of Archer-Daniels-Midland Co. have been consolidated by transfer to the home office sales of certain specialized products made by the Werner G. Smith Co., a division of ADM at Cleveland. Specific oils affected include refrigerated fish oils, oxidized fish oils, kettle bodied fish oils, synthesized copolymer oils, polyesters, and china wood (tung) oils.

• **An Export Sales Division** has been established by Diamond Alkali Co. to coordinate foreign sales of alkalies and related chemicals. It will handle export sales of tanning materials made by Diamond's Martin Dennis Division, and precipitated calcium carbonate, carbon tetrachloride and detergent cleansers produced at other company plants. Diamond will continue to sell soda ash, solid caustic soda and bicarbonate of soda principally through the U. S. Alkali Export Association, but the new division will market these products on a selective basis through foreign agents and established merchant exporters here.

• **Charles A. Meyer & Associates, Inc.** has moved from its New York City location to upper Nyack-On-The-Hudson, New York.

• **Air Reduction Co., Inc.** has simplified its corporate structure in a move to consolidate activities and increase efficiency of operations. It involves liquidation of all wholly owned domestic subsidiaries. The respective businesses now conducted by active domestic subsidiaries will be conducted by corresponding divisions of the corporation.

The ten new divisions and their activities are as follows: Welding equipment and compressed gases—Air Reduction Sales Co., Air Reduction Pacific Co., and Air Reduction Magnolia Co.; medical—Ohio Chemical & Surgical Equipment Co., Ohio Chemical Pacific Co., and Hospital Supply & Watters Laboratories; calcium carbide—National Carbide Co.; dry ice—Pure Carbonic Co.; export-import—Airco Co. International; and the Airco Equipment Manufacturing Division.

• **American Air Filter Co., Inc.,** Louisville, Ky., manufacturer of air filters and dust collectors, and Herman Nelson Corp., Moline, Ill., manufacturer of heating and ventilating equipment, have merged. Nelson will be operated as the Herman Nelson Division of American Air Filter and will continue to maintain headquarters and facilities in Moline. The merger company's principal offices and headquarters will be in Louisville, Ky.

• **A proposal increasing pension benefits** has been made by the Du Pont Co. to all employees. It would increase company payments at all levels, without cost to employee. In addition, it would set a $100-a-month total minimum retirement income including primary Social Security benefits at age 65 for employees of 25 or more years service. The proposal is a further modification of the Du Pont pension plan, first established in 1904.

• **The Martin Dennis Co.,** a wholly-owned subsidiary of Diamond Alkali Co. with plants at Newark and Kearny, N. J., has become an operating division of Diamond. A producer of chromium chemicals, The Martin Dennis Co. was organized in 1893 as a New Jersey corporation. It was purchased by Diamond in March, 1948. Its products are used principally in the manufacture of pigments, leather tanning and chrome-plating.

• **Industrial instrumentation** training school schedules to be conducted for the first six months of 1950 by Brown Instruments division of Minneapolis-Honeywell Regulator Co. will include four short courses of five weeks each and one long course of 13 weeks.

## CALENDAR *of* EVENTS

*AMERICAN CHEMICAL SOCIETY,* 117th national meeting, (divided) Houston, Texas, March 26-30; Philadelphia, Pa., April 9-13; Detroit, Mich., April 16-20.

*AMERICAN INSTITUTE OF CHEMICAL ENGINEERS,* regional meeting, Swampscott, Mass., May 28-31.

*AMERICAN OIL CHEMISTS SOCIETY,* spring meeting, Atlanta-Biltmore Hotel, Atlanta, Ga., May 1-3.

*AMERICAN PHARMACEUTICAL ASSOCIATION,* Traymore Hotel, Atlantic City, N. J., April 30-May 5.

*ASSOCIATION OF CONSULTING CHEMISTS AND CHEMICAL ENGINEERS,* Hotel Shelburne, New York City, April 25.

*COMPRESSED AIR AND GAS INSTITUTE,* The Greenbrier, White Sulphur Springs, W. Va., March 23-25.

*DRUG CHEMICAL AND ALLIED TRADES SECTION,* New York Board of Trade, 24th annual dinner, Waldorf-Astoria, New York City, March 9.

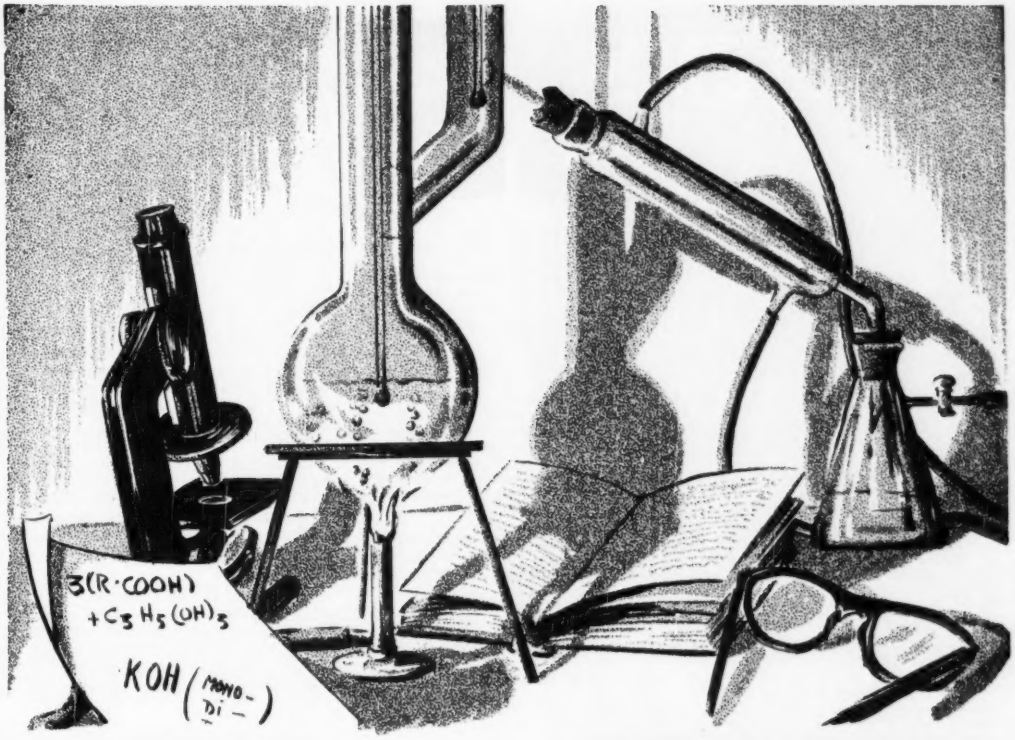
*ELECTROCHEMICAL SOCIETY,* annual meeting, Hotel Statler, Cleveland, Ohio, April 19-22.

*FLAVORING EXTRACT MANUFACTURERS' ASSOCIATION,* 40th annual convention, Traymore Hotel, Atlantic City, N. J., May 7-10.

*INSTITUTE OF FOOD TECHNOLOGISTS,* decennial conference, Edgewater Beach Hotel, Chicago, May 21-25.

*NATIONAL PETROLEUM ASSOCIATION,* Cleveland Hotel, Cleveland, Ohio, April 12-14.

*NATIONAL PLASTICS EXPOSITION,* Navy Pier, Chicago, March 28-31.




# SEARCH and RESEARCH

**A. GROSS PRODUCTS**

Stearic Acid
Tallow Fatty Acids
Red Oil (Oleic)
White Oleine
Coconut Fatty Acids
Cottonseed Fatty Acids
Soya Fatty Acids
Saponification
Crude Glycerine
Stearine Pitch
Cottonseed Pitch
Hydrogenated
Tallow Fatty Acids

Search and research at A. Gross' laboratories never stops. We can give you many examples of the results. For instance, there's A. Gross' Stearic Acid for monostearate production which is noted for its color stability, mildness of odor and assurance of longer shelf life of end products.

Or there's the Gross series of Coconut Fatty Acids — every one of their merits confirmed by actual plant results. Or the Gross Red Oil with its preferred odor, low titre, comparative purity. We could continue along these lines but why not write for our booklet describing Gross products today? Better still, why not ask for a sample, too?

Manufacturers since 1837

**A. GROSS & Company**

295 MADISON AVE., NEW YORK 17, N. Y.
FACTORY: NEWARK, N. J.

**Agents**

George Mann & Company, Inc.
Providence 3, R. I.

Baker & Gaffney
Philadelphia 7, Pennsylvania

J. C. Ackerman
Pittsburgh, Pennsylvania

Moreland Chemical Company
Spartanburg, S. C.

Smead & Small, Inc.
Cleveland 15, Ohio

Braun-Knecht-Heimann Company
San Francisco 19, California

Braun Corp.
Los Angeles 21, California

Charles Albert Smith, Ltd.
Toronto 3, Canada

Thompson Hayward Chemical Co.
Kansas City 8, Mo. (and Branches)

James O. Meyers & Sons
Buffalo, New York

J. W. Stark Company
Detroit 2, Michigan

# PERSONNEL

## *Company Officers*

• Tolman G. Everett has been elected secretary and comptroller of **Victor Chemical Works.** He has been secretary of the company since 1946 and succeeds William D. Webster in the comptrollership, the latter having become a member of the new governing committee of the company.

• A. B. Chadwick has been appointed president of **Solvay Process Division, Allied Chemical & Dye Corp.** He was formerly vice-president.

• R. P. Neptun has been elected vice president in charge of field sales of **The New York Quinine & Chemical Works, Inc.** He has served as a member of the Board of Directors of the American Pharmaceutical Manufacturers' Association, and is active in many other associations within the industry.

• William M. Hackman, who recently resigned as vice-president of the E. F. Drew Co., has been elected president of the **Hatco Chemical Co.** The Hatco organization produces a line of fats and oil specialties.

• **Aquadyne Corp.,** has appointed Gloster P. Henenor executive vice president. He will be responsible for Aquadyne's activity in the field of dust control in industry, and for product development in the applications of "wet water" for fire fighting and sterilizing.

***H. E. Millson (left), appointed assistant director of the Application Research Department of American Cyanamid Co.'s Calco Chemical Division, Bound Brook, N. J.; and Francis A. Wandell, appointed director of purchases and inventory control by J. T. Baker Chemical Co.***

## *Sales*

• Henry C. Carlson, former supervisor of the headquarters sales office for the Chemical Division of **Koppers Co., Inc.,** in Pittsburgh, has been named Midwest district sales manager for Koppers chemicals and plastics with offices in Chicago.

• J. P. Cunningham has been appointed Chicago district manager of **Shell Chemical Corp.** He has been engaged in various production, research and administrative capacities with Shell Development Corp., Shell Oil Co. and Shell Chemical Corp. prior to his present position of assistant to the sales manager, Eastern Division.

• John W. Rutland has been named general sales manager of the plant food division of **International Minerals & Chemical Corp.** He has been general sales manager of the potash division since 1948, and previously served as southern potash sales manager.

## *Research*

• Harry Collyer, formerly in charge of the rubber and plastics testing and technical service at the Boston Research and Development Department of **Godfrey L. Cabot, Inc,** Boston, has been appointed laboratory director of **Cabot Carbon Limited,** Ellesmere Port, England, effective on April 1st, 1950.

• André E. Briod, for 18 years with Nopco Chemical Co., is now connected with **R. S. Aries & Associates,** New York Consulting Engineers. He will devote his efforts to commercial chemical development problems, principally in the food and pharmaceutical fields, in the U.S.A. and abroad.

## *Associations*

• Charles V. Douglas of Heyden Chemical Corp. has been elected president of The **Salesmen's Association of the American Chemical Industry, Inc.,** for 1950.

## *Died*

• Clifford D. Prickett, 86, former vice president and director of **Hercules Powder Co.,** at his home, Wilmington, Del.

• Hugo Bamberger, president of the **Chemo-Puro Manufacturing Corp.,** of a heart ailment at his home. He was 62 years old.


**menadione, u.s.p. xiii**
oil soluble vitamin k useful in hemorrhagic diseases, diatheses due to low thrombin content.

**digitoxin, u.s.p. xiii**
in cardiac therapy.

**monobromated camphor**
useful in certain chronic neurologic conditions.

**propyl gallate**
an anti-oxidant for edible animal fats

**albumin tannate, medicinal**
useful in control of intestinal disturbances

**germ-i-tol**
a powerful quaternary ammonium compound, chemically, dimethyl benzyl lauryl ammonium chloride. A specially processed grade meeting the specifications of Benzalkonium Chloride U.S.P. also available.

write for our catalog

**fine organics, inc.**
211a EAST 19th STREET • NEW YORK 3, N. Y.



ORIGINAL PRODUCERS OF MAGNESIUM SALTS FROM SEA WATER

Magnesium salts from the sea

MAGNESIUM
CARBONATES
HYDROXIDES
OXIDES

MARINE MAGNESIUM PRODUCTS CORPORATION
Main Office, Plant and Laboratories
SOUTH SAN FRANCISCO, CALIFORNIA
Distributors:
WHITTAKER, CLARK & DANIELS, INC. 260 West Broadway, New York
CHICAGO: Harry Holland & Son, Inc.
CLEVELAND: Palmer Supplies Co.
TORONTO: Richardson Agencies, Ltd.
G. S. ROBINS & CO. 126 Chouteau Avenue, St. Louis
THE C. P. HALL CO. Akron, Chicago, Los Angeles
Write for Brochure

Tailor-made WAXES by ALLIED

**HUNDREDS OF FORMULAS** for different types of wax in our files prove that Allied builds the wax formula to suit the product —

- for any temperature — warm or cold
- for any material — metal, rubber, paper, wood or plastics
- for any method of application — laminating, brush, roller-coating or spraying in any form — slabs, drums or solution

Allied starts in where others leave off in the compounding of special waxes. Our highly skilled staff of laboratory technicians are constantly delving into new applications ... new fields of use. Allied will take any wax problem, and give you that worthwhile *extra* in service and results.

*Thanks to you...* THIS IS OUR 25 ANNIVERSARY

WAX AND OIL DIVISION

**Allied Asphalt & Mineral Corp.**

ESTABLISHED IN 1925

217 BROADWAY, NEW YORK 7 • FACTORY: DUNELLEN, N. J.

AGENTS AND WAREHOUSE STOCKS IN PRINCIPAL CENTERS



**GUMS** (CRUDE POWDERED) *Chemicals and Drugs*

GUM ARABIC

GUM TRAGACANTH

| GUMS: | SPECIALTIES: |
|---|---|
| GUM ARABIC (Bleached) | MENTHOL (Crystals) |
| GUM GHATTI | ★ |
| GUM KARAYA (Indian) | TEA SEED OIL |
| GUM EGYPTIAN | ★ |
| GUM LOCUST (Carob Flour) | EGG ALBUMEN |
| QUINCE SEED | EGG YOLK |
| ★ | BLOOD ALBUMEN |
| CASEIN | JAPAN WAX |
| | CANDELILLA WAX |

**PAUL A. DUNKEL**

AND COMPANY, INC.

*IMPORTERS AND EXPORTERS*

1 WALL STREET, NEW YORK 5, N.Y.

Hanover 2-3750

919 N. MICHIGAN AVE., CHICAGO

TEL SUP 7-2462

REPRESENTATIVES:

CHICAGO: CLARENCE MORGAN, INC.

BOSTON: P. A. HOUGHTON, INC.

PHILADELPHIA: BAKER & GAFFNEY

LOS ANGELES: JOHN A. HUGHES



**MURIATE OF POTASH**

62/63% $K_2O$ Also 50% $K_2O$

**MANURE SALTS**

20% $K_2O$ Minimum

**UNITED STATES POTASH COMPANY INC.**

30 Rockefeller Plaza, New York 20, N. Y.

# CHEMICAL MARKETS

## *Strike, Oversupply Plague Fertilizer Industry*

Too little and too much are the anomalous headaches of the fertilizer industry at present. The potash strike at Carlsbad, N. M., that has been going on since November 18, is a serious threat to spring mixed fertilizer production. On the other hand, all the nitrogen industry is loaded with stored material, and consumers are back to their old buying habits of ordering just before they need the fertilizer to go into the ground.

The three big companies in Carlsbad that supply 85% of potash production are losing 5000 tons of salts a day. The two companies obtaining potash from brine at Trona, Cal., account for most of the remaining 15%, which is not sufficient to satisfy the mixed fertilizer industry's needs for spring production. Mixed fertilizer requires potash as well as nitrogen and phosphoric acid, and since most companies do not have a big stockpile of potash, its production is being seriously curtailed. Some hope lies in Government action to get the miners back to work, and a temporary injunction has recently been granted against unfair union practices. A hearing before the National Labor Relations Board on these charges was scheduled for February 14.

Lack of demand from mixed fertilizer producers has aggravated the long supplies of ammonium sulfate and ammonium nitrate. The nitrogen industry has been forced to store some of this in rented space as it hopes for a pickup in domestic fertilizer purchases. In addition, the industry is trying to get export controls lifted so that they won't have to shut down. As it now stands, it takes so long to get an export license that only a part of the licensed quantities ever leave the country. Should prime producers be forced to curtail operations, it will take a long time to get operations going again.

Some relief is expected with the Army's getting out of the nitrogenous fertilizer industry (*see News of the Month, this issue*). This is in line with the desire of both the industry and the Army which wanted to get out for some time, but was kept in by Congress.

## *Inorganics Register Slight Gain*

United States production levels of industrially important inorganic chemicals generally were slightly higher for the month of November as compared with the previous month and varied little from the levels reported for November 1948, according to the Bureau of the Census. Increases from October 1949 were reported for 18 of the 35 chemicals included in the Bureau's continuous monthly survey, while decreases were reported for 13. Fifteen of the 35 chemicals were produced in larger quantity during November 1949 than during November 1948.

November production of synthetic ammonium sulfate, hydrochloric acid and hydrogen was the highest on record. Other important inorganic chemicals showing production gains over the previous month were oxygen, synthetic anhydrous ammonia, ammonium nitrate, calcium carbide, chlorine, nitric acid, soda ash, caustic soda, sodium sulfate and sulfuric acid. Declines from the preceding month's totals were reported for carbon dioxide, phosphoric acid, sodium bichromate and chromate, sodium bicarbonate, certain sodium phosphate compounds and sodium silicate.

## *LP-Gas Gains as Chemical Raw Material*

Use of LP-Gas as a chemical raw material continued its advance in 1949 along with the overall growth of the liquefied petroleum gas industry. In a report in the Compressed Gas Bulletin of January 3, K. W. Rugh and E. O. Mattocks, of Phillips Petroleum Co., estimate that chemical manufacturers used 525,000,000 gallons of LP-Gas in 1949, an increase of 6.9% over 1948 consumption. Total volume of LP-Gas marketed in the U. S. for all purposes during the year was 2,725,000,000 gallons, an 8.5% increase over the volume sold in 1948.

The continuing acceptance of LP-Gas as an ideal raw material for manufacture of chemical intermediates is illustrated by the following tabulation of its sales for chemical manufacture over the years for which such data have been recorded (figures in 1000 gal.):

| | |
|---|---|
| 1937 | 26,792 |
| 1938 | 32,299 |
| 1939 | 26,892 |
| 1940 | 34,671 |
| 1941 | 44,206 |
| 1942 | 53,038 |
| 1943 | 55,356 |
| 1944 | 151,985 |
| 1945 | 224,291 |
| 1946 | 311,499 |
| 1947 | 414,267 |
| 1948 | 490,964 |
| 1949 | 525,000 |

Figures in the above table were obtained by the writers of the report from U. S. Bureau of Mines reports except for 1949, which they estimated. Total sales volume includes all LP-Gas (propane, butane and propane-butane mixtures) when sold as such. Intercompany sales

The first aluminum tank car ever built was produced by General American in 1928. It was GATX 8000—built specifically for Glacial Acetic Acid.

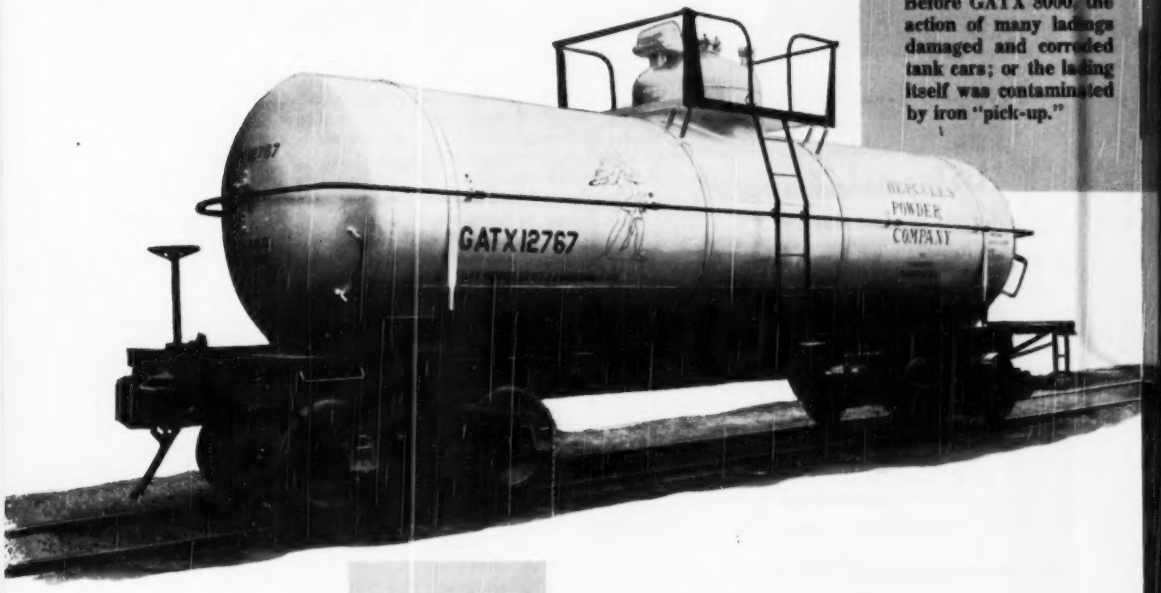
# GATX *aluminum cars for chemicals*

modern **GATX** aluminum cars now carry:

**Glacial Acetic Acid · Formaldehyde**
**Hydrogen Peroxide Bleach · Fatty Acids**
**Acetic Anhydride · Naphthenic Acid**
**Butylaldehyde · Water White Rosin**
**Glycerin · Nylon Salt Solution**
**52% Hydrogen Peroxide · Nitrogen Fertilizer**
**Oleic Acid · Nitric Acid**
**Trichlorobenzene · Ammonium Nitrate**

***why aluminum cars?***

**Before GATX 8000, the action of many ladings damaged and corroded tank cars; or the lading itself was contaminated by iron "pick-up."**




GATX GENERAL AMERICAN TRADE MARK

**GENERAL AMERICAN TRANSPORTATION CORPORATION**
135 South LaSalle Street · Chicago 90, Illinois

DISTRICT OFFICES: *Buffalo · Cleveland · Dallas · Houston · Los Angeles New Orleans · New York · Pittsburgh · St. Louis · San Francisco Seattle · Tulsa · Washington*

EXPORT DEPT. *10 East 49th Street, New York 17, New York*

**FOR SALE**

| | |
|---|---|
| ALUMINA HYDRATE | 12c lb |
| AMIDOL | 75c lb |
| AROCLOR, 1270 | 12c lb |
| BISMUTH SUBCARB. TAB. 500's | 35c bt |
| BISMUTH SUBSALICYLATE | $2.45 lb. |
| CARNAUBA WAX COMP. | 17c lb |
| DICALC. PHOSP. DIHYDRATE | 5½c lb. |
| 2-4, DICHLORBENZOIC ACID | 50c lb |
| DICYANDIAMIDE | 13c lb. |
| HEMATOXYLIN CP 10 gm. bt. | 75c lb |
| IODOFORM, ¼# & 1# bt. | $3.00 lb. |
| MAGNESIUM METAL PDR. | 15c lb. |
| MERCAPEO (AERO AC-165) | 12c lb |
| PARIS GREEN | 18c lb. |
| POTASH CITRATE | 29c lb. |
| POT. METABISULF. ANH., 1 lb bt., | 12c lb |
| PYROGALLIC ACID CRYS. CP | $1.90 lb. |
| RED. PRUSS. POTASH | 51c lb. |
| SALICYLIC ACID, USP | 34c lb. |
| SILICA GEL | 12c lb. |
| SODA PHOSP. DIBASIC USP | 14c lb. |
| SULFADIAZINE SODIUM | $15.00 lb. |
| SULFAGUANIDINE, 1 lb. bt. | $3.35 lb. |
| SULFAGUANIDINE TABLETS | $3.50 M |
| SULFAPYRIDINE TABLETS | $4.50 M |
| ZINC STEARATE USP | 27c lb. |

**OTHER ITEMS—SEND INQUIRIES**

**Chemical Service Corporation**

EST. 1925

96 A BEAVER ST. NEW YORK 5, N. Y.

HAnover 2-6970



**√ CHECK LIST** — Cargille Products for Chemists

**TRANSPARENT PLASTIC BOXES:**
For keeping samples, specimens and small parts in order; completely visible. 5 sizes ..... 101

**BOILING STONES:**
Effective anti-bumping agent for overheated liquids. Speeds distillations, yields shorper fractions. Sample on request ..... 102

**VISCOSITY TUBES:**
Matched for the Air-Bubble Method of comparing viscosities. Widely used in the Varnish Industry ..... 103

*Just Specify Code Number*

**R. P. CARGILLE**

118 Liberty St. New York 6, N. Y.



**CI** *Advertising ...for results*


transactions that would cause duplication of sales figures have been eliminated. Figures do not include sales of hydrocarbons to plants manufacturing synthetic rubber or its components.

### *Rubber Consumption Off Slightly in 1949*

Estimated new rubber consumption by the rubber manufacturing industry in 1949 was 980,000 long tons, as compared with 1,069,000 tons in 1948, according to The Rubber Manufacturers Association, Inc. Significant in the consumption picture was the strong position of American-made synthetic rubbers which more than held their own against imported natural rubbers for the year. Synthetic rubber use, at 410,000 long tons, was proportionately higher than it was in 1948.

The proportion of natural rubber consumed, 570,000 long tons, was relatively less than in the year earlier. This was in spite of substantial price advantages. On standard market grade, No. 1 ribbed smoked sheets, the price advantage favoring natural rubber ranged from fractions to as much as two cents a pound. On lower grades which are used in substantial quantity by the industry these differentials ranged to as much as five cents a pound below general purpose synthetic rubber. This price advantage of the natural product was further strengthened by the efforts of the United States government to ease the British and Far Eastern economic crises of 1949 by making substantial reductions in its regulations requiring the use of synthetic rubber in transportation end products. In this move the government cut mandatory use from 223,000 to 162,000 long tons of general purpose synthetic rubber per year, and eliminated all mandatory use of butyl rubber, though retaining standby controls which could be invoked should butyl consumption drop below the level of 15,000 long tons a year. Actually, butyl consumption was more

(*Turn to page 293*)

### *Market Review*

**Coaltar chemicals** were the center of most of the activity in chemical markets. When toluol followed benzol up to 22¢ a gallon, there was a considerable amount of forward buying as consumers sought to protect themselves for their future requirements. Both benzol and toluol were tight, and that situation seemed likely to prevail for some months to come.

**Crude naphthalene** continued relatively tight, but there were imports to ease domestic demand. It was felt that imports might change the future competitive picture since they were reportedly going at 3¼¢ a pound as compared to 5½¢ for the domestic. USP cresol was reduced about 1¢ a pound to 10½¢ in a price revision in cresol and cresylic acid. Technical cresol now ranges from 11.3¢ to 12.55¢ a pound in carload lots, nonreturnable drums.

**With the approach** of the active period in their industry, fertilizer manufacturers were worried about the strikes at Carlsbad, N. M. that cut off supplies of potash. Some imported sulfate and muriate of potash helped a little, but the very tight situation caused ammonium sulfate to pile up. Manufacturers unable to get potash for mixed fertilizers were not in the market for ammonium sulfate.

**It was the same** old story with chlorine: heavy demand persisted. There was some easing in cylinder business, however.

**Tightness in supply** of pyrethrum forced the price of the powder up to 41½¢ a pound, and it is feared that supplies may get shorter. Lead arsenate was reduced 2¢ a pound to 25¢.

**Both butyl alcohol** and butyl acetate were reduced ½¢ a pound as a result of poor demand. New prices are 12¢, 13½¢ and 14½¢ a pound for tankcars, carlots, and less than carlots, respectively. Secondary butyl alcohol and acetate followed with cuts of 1¢ and ½¢ a pound, respectively, and the new price for both is 9¢, 10½¢ and 11¢ in quantities as above. Isobutyl alcohol also dipped to the same level prevailing for butyl alcohol: 12¢, 12½¢, 13½¢, and 14½¢ on the same basis.

**There appeared** to be a spread of 1¢ between what Cuban producers and domestic importers thought the price of Cuban molasses should be, with the prospect of the price being set at about 3½¢ a gallon.

**Glycerin was tight** as consumption continued high, and there was little hope of improvement. There were reports of domestic offerings of crude at about 1¢ over the market. Photographic chemicals also were in brisk demand. Sorbitol was reduced to 16¼¢ a pound for the aqueous solution and to 22¼¢ a pound for the commercial aqueous solution, both prices, carload drums, works.

**Gum tragacanth** was moving at lower prices, and gum arabic was offered at ¼¢ off previous price of 12¼¢ a pound. German montan wax was quoted at 18¢—2¢ off its previous price.

# BICARBONATE of SODA
# MONOHYDRATE of SODA
# SAL SODA

STANDARD QUALITY

CHURCH & DWIGHT CO. INC.
Established 1846
70 PINE STREET NEW YORK 5, N.Y.

EDW. S. BURKE J. F. HOLLYWOOD

EDW. S. BURKE
Established 1917
65 PINE STREET, NEW YORK 5, N. Y.

*Representing:*
CARUS CHEMICAL CO., INC.

Potassium Permanganate, USP and Technical.
Hydroquinone, Photographic and Technical.
Sodium Benzoate, U.S.P. and Technical.
Acid Benzoic, U.S.P. and Technical.

*Representing:*
BENZOL PRODUCTS CO.

Aminophylline U.S.P.
Theophylline U.S.P.
Phenobarbital U.S.P.
Sodium Phenobarbital U.S.P.
And Other Fine Pharmaceuticals.

# ORGANIC PEROXIDES

## KETONE PEROXIDES

LUPERSOL* DDM (60% Methyl Ethyl Ketone Peroxide in Dimethyl Phthalate)

LUPERSOL* FDM (80% Methyl Isobutyl Ketone Peroxide in Dimethyl Phthalate)

METHYL AMYL KETONE PEROXIDE

CYCLOHEXANONE PEROXIDE, TECHNICAL

ALSO AVAILABLE

ALDEHYDE PEROXIDES DIACYL PEROXIDES

ALKYL HYDROPEROXIDES AND DERIVATIVES

SPECIAL ORGANIC PEROXIDES

*REGISTERED TRADEMARK

TRADE MARK

LUCIDOL DIVISION
NOVADEL-AGENE CORPORATION
BUFFALO 5, NEW YORK

# *Chemical Industries* MARKET PLACE

CLASSIFIED ADVERTISING

**LOCAL STOCKS • CHEMICALS • EQUIPMENT • RAW MATERIALS • SPECIALTIES • EMPLOYMENT**

RATES IN THIS SECTION: Displayed: $7.00 per inch. Contract rates on request. Undisplayed: "Position Wanted" and "Help Wanted" ads: 5c per word. Box number counts as 10 words. Minimum charge: $1.00

NEW ADVERTISEMENTS must be received before the 17th of the month preceding date of issue in which publication is desired. Address Chemical Industries Classified, 522 Fifth Ave., New York 18, N. Y.

## ILLINOIS

**DIACETYL**
•
**DIIODOSALICYLIC ACID**

LaPINE & COMPANY
INDUSTRIAL AND REAGENT CHEMICALS
121 W. Hubbard St., Chicago 10, Ill.

*Now Available*
CHEMICALLY PURE
**METHYL METHACRYLATE**
*(Acrylic)*
CH C(CH) — COOH
Monomeric-Liquid
and
Polymeric Powder
**PETERS CHEMICAL MFG. CO.**
3623 Lake Street MELROSE PARK, ILL.
Telephone—Melrose Park 643

## MASSACHUSETTS

**DOE & INGALLS, INC.**
*Chemicals and Solvents*
Full List of Our Products: see Chemical Guide-Book
Everett Station, Boston EVErett 4610

**ALAN A. CLAFLIN**
*Manufacturers' Agent*
DYESTUFFS and CHEMICALS
Specializing in
BENTONITE
and
TALC
88 Broad Street Boston 10, Mass.
TELEPHONE Liberty 5944-5945

**GEORGE MANN & CO., INC.**
*Industrial Chemicals*
GEORGE MANN & CO., INC.
Fox Point Blvd., Providence 3, R. I.
Phone GAspee 8466 • Teletype Prov. 75
Branch Office and Plant
Stoneham 80, Mass. • Phone WINchester 2910

## MISSOURI

**MERCURY**
Pure grade, .0000% non volatile residues. Each lot tested for purity before packaging. Packed in 1, 5 & 10 lb. glass containers. For prices & terms address H M Co., P. O. Box 6012, Dept. C, Kansas City, Mo.

## NEW JERSEY

FOR PROMPT SERVICE IN THE NEW YORK AREA
**SOLVENTS—ALCOHOLS EXTENDERS**
CHEMICAL SOLVENTS
Incorporated
60 PARK PLACE NEWARK 2, N J
WOrth 2-7763 • MArket 2-3650

## NEW YORK

**POTASH SULFATE**
Will shortly have available regular production 200-300 tons per month Pure Potash Sulfate and C. P. Potash Sulfate. Please state if you have year 'round requirements and quantities needed. Interested parties please address Box 4204, Chemical Industries, 522 Fifth Ave., New York 18, N. Y.

## PENNSYLVANIA

**SAUEREISEN**
**ACID PROOF CEMENTS**

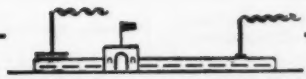
Let us help you with your acid-proofing problems
Send sketches and blueprints
Sauereisen Cements Co. Pittsburgh 15, Pa.

## RHODE ISLAND

**J. U. STARKWEATHER CO.**
INCORPORATED
241 Allens Avenue
Providence, R. I.
INDUSTRIAL CHEMICALS
TEXTILE SPECIALTIES

## MACHINERY and EQUIPMENT FOR SALE

**CHOICE ITEMS**
1—Williams Titan 5-Roll High Side Mill.
12—2-Truck Atmospheric Steam Heated Dryers, 500 sq. ft. drying surface.
6—Rotex Sifters, 40"x120", 40"x84".
10—Patterson Abbe porcelain-lined Pebble Mills, 6'x8', 5'x4', 4½'x3½'x', 3'x4', 3'x3', 2'x3'.
1—Patterson 3'x4' Steel Ball Mill.
6—Shriver, Sperry cast iron P&F Filter Presses, 30", 12".
4—Sweetland Filters #12, #2, S.S.
5—Louisville Tubular Dryers 6'x25', 6'x50'.
1—Bird 18"x28" monel Continuous Centrifuge.
1—A.T.&M. 30" Suspended Centrifugal, bottom discharge, heresite covered basket, m.d.
7—A.T.&M. & Tolhurst 48", 40", 30", 20" center slung Centrifugals, rubber, stainless, monel, exp. proof motors.
Send for complete stock list
BRILL EQUIPMENT COMPANY
2401 Third Ave., N. Y. 51, N. Y.
Telephone Cypress 2-5703



## ALLIED STEEL & EQUIPMENT CO.

Dept. M, Chester, New Jersey

**BUYS AND SELLS TANKS OF ALL KINDS**

jacketed • glass lined • stainless • pressure
MIXING EQUIPMENT • CONVEYORS
CRUSHERS • PUMPS • FILTER PRESSES

---

### SPECIALS

4—STAINLESS STEEL BUBBLE CAP COLUMNS —6' x 30'—Type 347 S.S.
3—STAINLESS STEEL CLOSED TANKS—3450 gals. with Coils—Type 347 S.S.
3—BARTLETT-SNOW STAINLESS STEEL KETTLES 1000 gals. with Ag. and 25 H.P. Motors. Type 347 S.S.
2—SPENCER TURBINE GAS BOOSTERS, Stainless Steel Contact Parts (347 S.S.) Cap. 600 c.f.m. at 80 oz.
1—PFAUDLER G. L. REACTOR—500 gal. NEW.

Send for Bulletin A-24

We Buy Individual Items to Complete Plants

**The Machinery & Equipment Corp.**
**533 West Broadway**
New York 12, N. Y. GRamercy 5-6680

---

### FOR SALE

BALL MILL—H. K. Porter, jacketed, 60" Inside Diameter, 71" long, grinding capacity 480 gal.—25 Hp. motor

ROD MILL—Marcy—12" diameter—24" long —complete set of rods

MIXER—J. H. Day—revolving drum type—72" long—42" diameter—350 gallon capacity

SCALE — Overhead track — Toledo — Style 31-2121FC—300 KG Capacity—200 KG Chart

***Aaron Equipment Company***

1347 S. Ashland Avenue, Chicago, Illinois
Chesapeake 3-5300

---

### SMART BUYERS of CHEMICAL EQUIPMENT

*Call this number*

**SOuth 8-4551**

TO SAVE MONEY, TIME AND EFFORT IN LOCATING SCARCE ITEMS

**EQUIPMENT CLEARING HOUSE, INC.**

289—10th St. BKLYN 15, N. Y.

***"You Can BANK on ECH"***

---

## EQUIPMENT

### FOR CHEMICAL AND PROCESS INDUSTRIES

1—#6 Mikro Atomizer, Stainless Steel, w/20 HP Motor.
1—#2TH Pulverizer, w/15 HP Motor.
1—Sperry Stainless Steel Filter Press 24" x 24", 12 chambers.
1—Sperry Stainless Steel Filter Press, 12" x 12", 15 chambers.
1—Patterson nickel lined Blender, 192 cu. ft. cap. w/20 HP Motor.
2—Pfaudler 50 gallon glass lined jacketed stills, complete.
1—Pfaudler 5 gallon glass lined jacketed still, complete.
1—J. P. Devine 5 shelf Vacuum Shelf Dryer.

**R. GELB & SONS, INC. UNION, N. J.**

UNionville 2-4900

---

Surplus Equipment

\+ Classified Ad

= CASH

---

### FOR SALE

2 Spencer Gas Boosters or Compressors, T347 stainless steel, 600 CFM @ 80 oz. pr. 30 HP motor.
2 Sharples #16V Vaportite Super Centrifuges, dual purpose bowl, T304 Stainless Steel contact parts.
3 1000 gal. Stainless Steel T347 direct fired heavy duty reaction kettles, heavy duty agitator, 25 HP 4 speed motor; 8' dia. x 3' deep.
3 3400 gal. Stainless Steel T347 Tanks, 9' dia. x 7'3" deep, flat bot., flat bolted top, 2" pipe coils.
2 750 gal. Stainless Steel T347 Tanks, 33" dia. x 12' high—formerly spray towers or calcination tanks.
4 Stainless Steel T347 Bubble Cap Columns, 6' dia. x 30' high, 20 plates, 38—6" dia. caps per plate, stainless coils each plate.
1 Glascote 75 gal. Glass lined kettle, steam jacket, agitator, clamped top.

**PERRY EQUIPMENT CORP.**

1521 W. Thompson St. Phila. 21, Penna.

---

## "Consolidated"

### REBUILT MACHINERY PRICE RIGHT

8—Oliver Vacuum Continuous Filters—8' x 12' Acid-Proof; 3—8' x 10' steel, wood staves—6' x 6' steel—11—6" x 18' steel.

1—2' x 12' Rotary Kiln, experimental, complete.

9—Dry Vacuum Pumps—Oliver 14" x 8" 400 CFM—IR 1048 CFM Stokes 212C 100 CFM—Penna. 14" x 5" 67 CFM —Devine 10 x 10, 12 x 12 x 12, 16 x 16 x 12—IR 31 x 13" 2832 CFM—IR 7410 CFM with motor drive.

1—600 sq. ft. all copper, Single Effect Evaporator or Calandria Pan with Barometric Condenser, Jet Ejector and all accessories.

1—42" x 42" Shriver, cast iron, plate & frame Filter Press, side feed, open delivery, 41 chambers, self-contained hydraulic closing device.

1—750 KVA AC Unaflow Engine Generator Set, non-condensing, complete with all accessories.

1—Louisville Rotary Steam Tube Dryer, 6' x 50'.

3—7500 gal. Steel Kettles, with copper coils, closed, Agitated. 10' dia. x 12'6" deep, 15' overall height.

1—2000 gal. Steel Kettle, jacketed, open top. Agitated, 7' dia. x 7'6" deep.

2—#12 Sweetland Filters, 2" centers; iron or copper leaves.

2—Baker Perkins Mixers size 17. Jacketed, 200 gallon.

1—Kilby 39" x 39" cast iron Filter Press, washing type, plate and frame, 47 chambers.

1—6' x 12' Allis-Chalmers Rod Mill, with chrome steel lining, charge of rods, with or without Falk gear reducer and 125 H.P. 3/60/2300 V. motor.

3—Hardinge Conical Ball Mills, iron lined, each with herringbone steel gears and arranged for direct motor drive; sizes 8' x 22" and 8' x 30".

2—Mikro Pulverizers #2-TH and 4-TH.

1—8' dia. Gayco Centrifugal Air Separator.

1—8' x 125' Reeves Rotary Kiln, refractories removed, now on wooden cribbing alongside railroad siding for immediate shipment; also 2' x 15' experimental Rotary Kiln complete.

***ONLY A PARTIAL LIST***

THE KEY TO SAVING TIME AND MONEY
**CONSOLIDATED PRODUCTS COMPANY, INC.**

14-18 Park Row • New York 7, N. Y.
SHOPS: 331 Doremus Ave., Newark 5, N. J.
CABLE ADDRESS: "EQUIPMENT," N. Y.

LOW TEMPERATURE METAL DEWAR VACUUM FLASKS . . .

SUPAIRCO

ALL-METAL CONTAINERS FOR LIQUEFIED ATMOSPHERIC GASES . . .

For use with liquefied gases or any extremely cold materials. Sizes: from ½ liter to 50 liters. Flasks are made of least porous metal, designed and built in accordance with accepted principles of low temperature refrigeration.

Supplied to hundreds of users in the U. S. A. and foreign countries for the past 20 years and considered by many to be the most efficient in design and construction. Immediate delivery of sizes up to 100 liters.

Make your own liquid air, nitrogen, or oxygen with a SUPAIRCO plant — specifications and prices on request.

*Send for Catalog*

**Superior Air Products Co.**
129 Malvern St. • Newark 5, N. J.

*Send for Prices*

WE CAN FURNISH YOU AT ANY POINT NEW AND USED STEEL DRUMS, NEW GALVANIZED DRUMS, RECONDITIONED DRUMS, AND NEW AND USED SLACK BARRELS AND FIBRE BARRELS.

**BUCKEYE COOPERAGE CO.**
3800 Orange Avenue
Cleveland 15, Ohio

**CI** *Classified ...for results*

# $ for SALE

36" Filter Press cast iron, 37 chamber, hyd. closing device.
4—Rotex sifters, model 41 and 43—MD.
3—30" Shriver C. I. filter presses, 36 chambers, O.D. recessed P & F, center feed.
Swenson vertical film type single effect evaporator, karbate tubes, monel sheets, with steel condensor, rubber lined air ejector, pump and all interconnecting piping.
2—J. H. Day 12" x 32" three roller mills, watercooled.
1—Shriver 24" cast iron filter press, 54 chambers, O.D.
1—J. H. Day 16" x 40" watercooled three roller mill.
1—A.T.M. 20" S.S. suspended type centrifuge, MD. bottom dis. plow.
4—Alsop 2 H.P. portable agitators—S.S. shafts & props.
1—Pfaudler 750 gal. model LL glass lined jacketed Reactor.

THIS IS BUT A SAMPLE OF THE MANY OUTSTANDING ITEMS NOW IN STOCK—SEND FOR BULLETIN 72M FOR THE MOST COMPLETE LIST OF PROCESSING MACHINERY IN THE U.S.

*NOW IS THE TIME TO "CLEAN HOUSE"—SEND US YOUR LIST OF IDLE SURPLUS EQUIPMENT*

**CHEMICAL & PROCESS MACHINERY CORP.**
146-148 GRAND STREET
NEW YORK 13, N. Y.
WOrth 4-8130

FMC

**Fred. R. Firstenberg President of the FIRST MACHINERY CORP. announces a NEW RENTAL PLAN on good rebuilt-used EQUIPMENT**

For short term operation or for pilot plant experimental purposes, this HIRE-PURCHASE PLAN offers the opportunity to apply rental fees to eventual purchase.

EQUIPMENT FOR:
Chemicals • Food Products
Plastics • Oils & Fats
Rubber • Inks & Dyes
Ceramics • Explosives
Metallurgy • Distilling
Confections • Cosmetics
Pharmaceuticals • Soap • Wax
and General Processing

*Send for Bulletins.*

**FIRST MACHINERY CORP.**
157 Hudson Street,
New York 13, N. Y.


*Chemists, Engineers, Executives:*

## DO YOU HAVE THESE CURRENT REFERENCES?

Listed below are the articles appearing recently in Chemical Industries that our readers—as indicated by their demand for reprints—have found most helpful and worthwhile. Informative, comprehensive, and up-to-the-minute, they are the "last word" on the subjects they cover. Reprints may be obtained at the prices quoted.

*At 10 cents per copy**

**Centrifugals Replace Tables for Separation of Starch and Gluten**
by Robert L. Taylor, January, 1948 ☐

**Making 1080 Safe**
by R. F. Jenkins and H. C. Koehler, February, 1948 ☐

**Quaternary Ammonium Germicides**
by C. A. Lawrence, January, 1947 ☐

**What Makes a Good College Trainee for Chemical Companies?**
by Robert N. McMurry, January, 1949 ☐

*At 50 cents per copy**

**Agitators for Liquids**
by Julian C. Smith, March 1949 ☐

**Ammonia**
by Williard C. Cope, June & July, 1949 ☐

**Cellulose**
by Merle Heath, March, 1948 ☐

**Centrifuges, Technical Improvements Bring New Uses**
by Julian C. Smith, September, 1949 ☐

**Diaphragm vs Amalgam Cells**
by Robert B. MacMullin, July, 1947 ☐

**Employee Relations Practices in the Chemical Industry**
by Robert C. Forney, November, 1948 ☐

**Industrial Carbon**
by Raymond B. Ladoo and C. A. Stokes, October, 1948 ☐

**Synthetic Chemicals for Agriculture**
by R. H. Wellman, June and August, 1948 ☐

**Synthetic Detergents, Main Types, Uses, Properties and Prospects**
by John W. McCutcheon, November, 1947 ☐

**U. S. Chlorine, Where It Is Made and Where It Is Used**
by Ralph K. Lamie, April, 1948 ☐

**Urea and Melamine Resins Press Toward New Goals**
by James R. Dudley, February, 1949 ☐

* **Remittance *must* accompany all orders.**

Department R
CHEMICAL INDUSTRIES
522 Fifth Avenue
New York 18, New York

Please send me those items which I have checked. Enclosed is $ ..... to cover cost.

Name .....

Company .....

Address .....

.....

## *Chemical Markets*

*(Continued from page 288)*

than three times this figure. In general, voluntary consumption of American-made rubber showed a steady gain throughout the year.

### *Sulfur Continues at High Level*

The domestic sulfur industry produced 400,564 long tons of native sulfur during November, according to reports of producers to the Bureau of Mines. Production for the first 11 months of 1949 totaled 4,352,359 long tons—only slightly less than in the corresponding period in 1948 when 4,430,684 longs tons were produced.

Apparent sales during the month totaled 382,030 long tons.

### *1949 Tag Sales Surpass 1948 Total*

Complete returns for November and reports from a number of States for December reveal that the fertilizer tonnage represented by sales of tax tags and manufacturers' reports of shipments in 14 Southern and Midwestern States during 1949 exceeded the 1948 total by at least several hundred thousand tons.

The National Fertilizer Association reports that during November, tag sales and fertilizer shipments in the 14 States totaled 489,000 equivalent short tons as compared with 568,000 during the same month of 1948, but that the January-November total of 9,194,000 tons exceeds that of the first eleven months of 1948 by approximately 638,000 tons. The gains reflected in these figures were due almost entirely to increased tonnages reported by the Southern States, all 11 of which reported higher figures for January-November 1949 than for the same period a year earlier. Of the three Midwestern States which have reporting programs, only Missouri showed a rise; Kentucky reported a slight drop, while Indiana recorded a substantial decline. The equivalent January-November tonnage for the South totals 7,639,000 as compared with 6,918,000 a year ago, while Midwest figures for the first eleven months of the year just ended add up to 1,555,000 tons as compared with 1,637,000 tons during the corresponding period of 1948.

## HELP WANTED

**SALARIED POSITIONS. $3,600 to $30,000. This confidential service for outstanding men who desire a new connection, will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. TOMSETT ASSOCIATES, 1206 Berger Bldg., Pittsburgh 19, Pa.**

SALESMAN OR CHEMICAL ENGINEER NOW EMPLOYED TO CARRY SIDE-LINE OF BEESWAX—CARNUBA—CANDELILLA AND SUBSTITUTE WAXES. COMMISSIONS ON ALL REPEAT ORDERS FROM YOUR ACCOUNTS WRITE Box 4207, Chemical Industries, 522 Fifth Ave., New York 18, N. Y.

## SITUATIONS WANTED

Research Chemist-Bacteriologist. Ph.D. 10 years industrial research experience. New specialty products. New ideas. Versatile. Writing experience. Business Knowledge. Fermentations. Insecticides. Fungicides. Miscellaneous. Box 4203, Chemical Industries, 522 Fifth Ave., New York 18, N. Y.

CHEMIST-EXECUTIVE

Young PhD with 15 years research experience in organic and pharmaceutical fields will head up research or technical department or assist busy executive. Experience in chemical sales, advertising. Understands management's problems. Capable and aggressive. Tireless and faithful worker. Speaks foreign languages— American born. Patents. Wellknown in field of vitamins and anti-biotics. Desires responsible position with firm requiring man with above characteristics to help bring it to new heights during next decade. Available in February. Box 4206, Chemical Industries, 522 Fifth Ave., New York 18, N. Y.

Over ten years experience in research and development. Petroleum products, such as greases, oils and manufacture of synthetic fats for soaps, lubricants, heavy metal soaps, rust preventives, etc. Physical chemist desires consultant work. Replies confidential. Box 4208, Chemical Industries, 522 Fifth Ave., New York 18, N.Y.

## BUSINESS OPPORTUNITY

**NEW PRODUCTS WANTED**

**Have You a Chemical Product that can be sold to the hardware and the plumbing supply wholesalers? We can manufacture and distribute it for you nationally on a royalty or cash purchase basis. Box 4205, Chemical Industries, 522 Fifth Ave., New York 18, N. Y.**

## WANTED TO BUY

**WANTED—SOLVENT**
***Wastes of All Kinds***
***Redistill or Purchase***
**Also Surplus**
**Chemicals—Dyes—Pigments—Oils, etc.**
**By-Products, Residues, Equipment**
**CHEMICAL SERVICE CORP.**
**96-02 Beaver St. New York 5, N. Y.**

**WANTED — SURPLUS**
**Chemicals • Colors**
**Pigments • Starches • Solvents**
**Waxes • Glues • Drugs**
**Oils • Gums • Dyes**
**EASTERN COLOR & CHEMICAL CO.**
**143-145 Nassau St. New York 7, N. Y.**
**Cortlandt 7-7441**

**CASH PAID**
**For Capital Stock or Assets of**
**INDUSTRIAL ENTERPRISE**
**● WANTED**
***By large financially powerful diversified organization wishing to add another enterprise to present holdings.***
***Existing Personnel Normally Retained***
**Box 1210, 1474 B'way, N. Y. 18, N. Y.**

**AVAILABLE . . .**
***RECOVERY FACILITIES***
**All types crude mixtures**
**DISTILLATION and EXTRACTION**
**High Temperature High Vacuum**
**Simple Distillation Difficult Fractionations**
**Separation of close-boiling liquids isomers, and azeotropes our specialty**
**Drum Lots - Tank Cars**
**TRULAND**
**CHEMICAL & ENGINEERING CO., INC.**
**P.O. Box 426 Union, N. J.**
**Unionville 2-7260**

### U. S. PRODUCTION OF ALKALIES AND CHLORINE
(Short tons)

| Commodity | November 1949 | November 1948 | January-November 1949 | January-November 1948 |
|---|---|---|---|---|
| Soda ash, total | 378,383 | 417,354 | 3,750,042 | 4,444,219 |
| Ammonia soda process (98-100% $Na_2CO_3$): | | | | |
| Total wet and dry[1] | 360,971 | 398,158 | 3,561,604 | 4,169,426 |
| Finished light[2] | 191,341 | 211,650 | 1,867,079 | 2,100,810 |
| Finished dense | 119,303 | 125,252 | 1,211,450 | 1,443,143 |
| Natural ($Na_2CO_3$ equivalent)[3] | 17,412 | 19,196 | 188,438 | 274,793 |
| Caustic soda (100% NaOH) total[4] | 196,575 | 212,494 | 2,021,710 | 2,135,149 |
| Electrolytic process: | | | | |
| Liquid | 145,897 | 146,778 | 1,502,639 | 1,432,908 |
| Solid | 19,023 | 26,172 | 168,694 | 235,896 |
| Lime-soda process: | | | | |
| Liquid | 30,678 | 65,716 | 519,071 | 703,241 |
| Solid | 10,720 | 23,216 | 157,205 | 232,960 |
| Chlorine, gas | 115,943 | 147,451 | 1,598,316 | 1,466,562 |
| Sodium silicate (soluble silicate glass) | 46,073 | 46,868 | 404,398 | 445,807 |

[1] Includes quantities diverted to manufacture of caustic soda, sodium bicarbonate and other products, and quantities processed to finished light and finished dense soda ash.
[2] Excludes quantities converted to finished dense soda ash.
[3] Collected in cooperation with Bureau of Mines.
[4] Liquid production figures include quantities evaporated to solid caustic.
Source: Compiled from data supplied by the Bureau of Census.

# Professional Directory

## A GUIDE TO CHEMICAL, CHEMICAL ENGINEERING, MARKETING, AND LABORATORY SERVICES

**EVERETT F. CARMAN**
***Consulting Chemist***
Research, Development Analysis
Paints, Coatings, Varnishes, Printing Inks
Processes and Raw Materials
155 Highland Avenue
Montclair, N. J.

**FOOD RESEARCH LABORATORIES, INC.**
Founded 1922
Philip B. Hawk, Ph.D., President
Bernard L. Oser, Ph.D., Director
Research - Analyses - Consultation
Biological, Nutritional, Toxicological Studies
for the Food, Drug and Allied Industries
48-14 33rd Street, Long Island City 1, N. Y.

**W. Y. AGNEW**
Consultation—Design—Equipment
Nitrogenous and Phosphatic Fertilizers
Pigments — Specializing in Titanium Pigments
Complete Caustic — Chlorine Plants
500 Fifth Ave., New York 18, N. Y.

**EXPERIMENTAL PHYSICS RESEARCH**
Photochemistry, Chemical Kinetics, Reaction Rate Studies, Vapor Pressure of Low Pressure Substances, Structure of Solids and Adsorption Studies.
THE ANDERSON PHYSICAL LABORATORY
CHAMPAIGN, ILLINOIS

COLBURN LABORATORIES, INC.
Research Chemists
- New Product Development
- Organic Synthesis and Research
- Non-routine Analytical Work

431 S. Dearborn St. Chicago 5, Ill.

**CLARK MICROANALYTICAL LABORATORY**
CH, N, S, Hal., Alkoxyl, Alkimide, Acetyl, Terminal Methyl, etc. Complete and competent service by specialists in organic micro-chemical analysis.
Howard S. Clark, Director
104½ W. Main St. Urbana, Ill.

**John W. McCutcheon**
475 Fifth Avenue New York 17
LExington 2-0521
**CONSULTING CHEMIST**
Specializing in Oils, Fats, Soaps, Synthetic Detergents, and Glycerine. Laboratory: 307 E. 143rd St. New York 54. MElrose 5-4200.

**ALBERT L. JACOBS**
*Patents and Trademarks*
**Chemical Patents a Specialty**
60 East 42nd St., New York 17, N. Y.
MUrray Hill 2-2970

**R. S. ARIES AND ASSOCIATES**
Chemical Engineers & Economists
*Commercial Chemical Development*
Process Analysis • Surveys — Technical & Economic • Market Research • Product Development • Evaluations • Application Research.
26 Court St. Brooklyn 2, N. Y. MAin 4-0847

**THE GRAVELLE LABORATORY**
Specializing in Industrial Microscopy & Photomicrographic Illustration
Established in 1918 by Philip O. Gravelle, F.R.P.S.
To show the physical appearance of materials under magnification.
An informative service used by Scientific & Technical groups in many Industries, for Development, Control & Advertising.
114 Prospect St., South Orange, New Jersey
Phone: South Orange 2-2791

**FRED L. HUNTER**
*CONSULTING ENGINEER*
SPECIALIZING in HCl
Absorption • Production • Recovery
Materials & Equipment Design
200 Oak Terrace, Lake Bluff, Illinois
Tel: L. B. 1872

**DEMOCON FORMULATIONS**
For the Chemical Specialty, Toiletry and Drug fields. DEMOCONS are chemical bases easily transformed into useful consumer products. Fuss, inventory, equipment, technical skill reduced to a minimum.
**DEMO LABORATORIES**
Bogota, New Jersey, U. S. A.

**JOHN B. CALKIN**
Consultant to the Pulp and Paper and Chemical Process Industries
Technical and Marketing Consultations
Industrial Research Advisor
Laboratory & Pilot Plant Investigations
500 Fifth Avenue at 42nd Street
New York 18, N. Y.

**Paul H. Scrutchfield, Ph.D.**
**Consulting Chemist**
Specializing in synthetic resins for use in protective coatings, adhesives, paper, textiles, ion exchange and plastics.
1237 Church St. Hannibal, Mo.

**MOLNAR LABORATORIES**
Analytical and Consulting Chemists
Phenol Coefficient Tests
HORMONE ASSAYS
PENICILLIN ASSAYS
***Investigation, Control and Development of Pharmaceutical Products***
211 East 19th St., N. Y.
GRamercy 5-1030

**FOSTER D. SNELL INC.**
PRODUCT DEVELOPMENT AND EVALUATION.
Physical Testing — Bacteriology, Clinical Studies — Market Research, Surface Activity and Detergency
*Write For Booklet No. 11*
Chemists — Engineers
29 W 15 St. New York 11, N.Y. WA 4-8800

**CHEMICAL RESEARCH For Industry**
BJORKSTEN RESEARCH LABORATORIES
185 N. Wabash Ave.
Chicago 1, Ill.
ANDover 3-5386

**EVANS**
RESEARCH AND DEVELOPMENT CORPORATION
★
*Send for Booklet "C"*
Chemical Research
Processes - Products
Pilot Plant
Optical and Mechanical Sections
*Inspect our unusual facilities*
★
250 East 43rd Street
New York 17, N. Y.
MURRAY HILL 3-0071

# Professional Directory


**SEIL, PUTT & RUSBY, INC.**
Established 1921
Earl B. Putt—President and Director
Alfred S. Moss—Vice President
Stephen S. Veris, Ph.D.—Chief Chemist
Expert analyses of drugs, insecticides, foods and essential oils.
16 East 34th St., New York 16, N. Y.
Telephone Murray Hill 3-6368

**MARVIN J. UDY**
*Consulting Engineer*
Inorganic Chemistry, Electrochemistry, Electric Furnace Smelting, Process Metallurgy.
Ferro-Alloys, Calcium Carbide, Phosphorus
Telephone 2-6294
546 Portage Road Niagara Falls, N. Y.

*As part of our service we supply . . .*
STRUCTURAL MODELS, CHARTS, and PHYSICAL DATA REPORTS on the mechanism of catalytic and other chemical processes—specifically designed for specific problems.
DR. HENRY W. LOHSE
277 Broadway, Suite 609, New York, N. Y.
Catalysts, Catalytic Processes and Plants—also Spectrum Analysis and Electron Photographs

**NORTHWEST LABORATORIES**
2nd Ave. & James St.
Seattle 4, Wash.
**CONSULTING ENGINEERS & CHEMISTS**
- Industrial Research
- Market Research & Surveys
- Product & Process Development
- Physical & Chemical Testing

**CONSULTING**
Rubber Technologist
*Natural and Synthetic Rubber*
**R. R. OLIN LABORATORIES**
Complete Rubber Testing Facilities
Established 1927
P. O. Box 372, Akron 9, Ohio
Telephone HE 3724, FR 8551

**ROBERT CALVERT**
**Chemical Patents**
155 East 44th Street, New York 17, N. Y.
MUrray Hill 2-4980

***Yours for the Asking***
**— help with your advertising problems, large or small.**
*Call, wire or phone*
**CHEMICAL INDUSTRIES, Advertising Department**
522 Fifth Ave., New York 18, N. Y.
MUrray Hill 2-7888

GBI®
**For NUTRITIONAL RESEARCH**
Write for GBI catalog No. 677 listing products for biochemical, biological, and microbiological procedures.
**GENERAL BIOCHEMICALS, INC.**
69 LABORATORY PARK CHAGRIN FALLS, OHIO


## *New Equipment*

*(Continued from page 254)*

• Randolph Laboratories, Inc., 8 E. Kinzie St., Chicago, Ill., has produced a new, portable 6-lb. $CO_2$ **fire extinguisher.** The "6" is approved by the Underwriters' Laboratories, and in Underwriters' official tests it extinguished a 16 square foot gasoline fire in 7½ seconds.

• Eco Eng'r. Co., 12 New York Ave., Newark, N. J., has introduced the Eco **built-in** hydraulically balanced **by-pass.** With this balanced by-pass, the Eco pump, when acting as a booster pump, delivers a constant volume of liquid at constant pressure, regardless of variation in line pressure. The conventional by-pass allows the pressure to vary with the pressure of the line.

• A new line of 150# Hancock bronze **valves** with "500 Brinell" stainless steel seats and discs and a diaphragm construction claimed to be 125 to 230 percent stronger than in similar bronze valves is being produced by Manning, Maxwell & Moore, Inc., Watertown 72, Mass.

The new bronze valves are manufactured in sizes from ¼-2" available in globe and angle types, screwed ends.

The valves are designed for all pressures up to 150 psi saturated steam and for non-shock cold water, oil, or gas, 300 psi.

• A new line of **forged steel stop valves** built by Edward Valves, Inc., East Chicago, Ind., can be installed in almost any service where small OS&Y steel globe or angle valves are used. These all-purpose valves, the Fig. 444 series, fill the need for steel stop valves with wide applicability, good service characteristics, ease of repacking, and reduced pressure loss.

Swing bolted packing glands and large packing chambers make repacking extremely simple. Interchangeability of parts greatly reduces maintenance inventories. Bronze yoke bushings prevent galling or freezing of stem.

Constructed of drop forged steel for greater strength, they are available with bolted or union bonnets in sizes ¼" through 2" with screw or socket welding ends. Built of carbon or chromium-molybdenum steel for two ranges of service conditions, they are rated for 600 psi at 900°F and 1500 psi at 850°F.

• The new **centrifugal pump,** made of Ilium by Burgess-Parr Co., Freeport, Ill., has a semi-open non-clog type impeller which operates at speeds up to 3600 rpm. Readily assembled and disassembled for cleaning the new unit is supplied with varied types of packing or Ilium mechanical seals for laboratory or pilot plant work.

• A new, package-type direct-fired, **synthesizing unit** has been developed by The Patterson Foundry & Machine Co., E. Liverpool O. The unit consists of a 1000-gal. agitated synthesizing kettle, complete with a 2000-gal. jacketed and agitated cooling and thinning or reducing tank. The kettle is equipped with automatic and recording oil burners, and a reflux condenser.

The new unit may be used for oil-bodying and for manufacturing synthetic resins of all types. It is also adapted to many types of polymerization, refining, processing and distillation, and other functions required in the preparation of organic or inorganic products.

• Minimum mercury contamination and easy cleanout are among the features of a line of the new **reservoir-type manometers** of King Eng'r. Corp., Box 100, Ann Arbor, Mich.

The drain and cleanout plugs are straight-threaded and gasket-sealed to eliminate use of sealing compound on threads below the liquid surface. In addition, the reservoir and metal passages are lined with a thermosetting plastic to prevent contact of liquid and metal.

The glass tube has a chemically-inert synthetic packing ring that slips easily on or off the tube, permitting free removal of the tube without breakage.

The new manometers are regularly available in 14 lengths with scales from 12" to 116" long, for use on line pressures up to 200 psi.

# SARGENT LABORATORY CHEMICALS

***Reagent C.P. - U.S.P.***
***National Formulary • Technical***

- **REAGENT CHEMICALS**
- **ORGANIC CHEMICALS**
- **MICRO CHEMICALS**
- **STANDARD SOLUTIONS**
- **BIOLOGICAL STAINS**
- **CULTURE MEDIA**
- **MINERALS & ORES**

***RARE and UNUSUAL CHEMICALS are also available from E. H. SARGENT & CO. on special order.***

We maintain at all times complete duplicate stocks of the various well known brands of reagent chemicals, permitting a wide selection of merchandise of each brand and a choice of brand to suit individual preference. In this way we hope to further advance the usefulness of our services to the many thousands in scientific work who are our friends and clients.

***PROMPT SHIPMENT OF STOCK MERCHANDISE IS ASSURED***

**SARGENT**

*SCIENTIFIC LABORATORY INSTRUMENTS - APPARATUS - CHEMICALS*
E. H. SARGENT & COMPANY, 4647 W. FOSTER AVE., CHICAGO 30, ILLINOIS
MICHIGAN DIVISION, 1959 EAST JEFFERSON STREET, DETROIT 7, MICHIGAN
SOUTH-WESTERN DIVISION, 5913 PEELER STREET, DALLAS 9, TEXAS

# INDEX *of* ADVERTISERS


Aaron Equipment Co. ..... 291
Agnew, W. Y. ..... 294
Allied Asphalt & Mineral Corp. ..... 285
Allied Steel & Equipment Co. ..... 291
American-British Chemical Supplies, Inc. ..... 271
American Can Co. ..... 263
Anderson Physical Lab. ..... 294
Ansul Chemical Co. ..... 248
Aries & Associates, R. S. ..... 294
Arkell & Smiths ..... 204
Armour & Co., Chemical Div. ..... 165, 227
Atlantic Refining Co. ..... 273
Atlas Powder Co. ..... 164

Baker & Adamson Products, General Chemical Div., Allied Chemical & Dye Corp. ..... 207
Baker Chemical Co., J. T. ..... 249
Barrett Div., Allied Chem. & Dye Corp. ..... 229, 234
Bjorksten Research Labs. ..... 294
Brill Equipment Co. ..... 290
Buckeye Cooperage Co. ..... 292
Burke, Edward S. ..... 289

Calkin, John B. ..... 294
Calvert, Robert ..... 295
Carbide & Carbon Chemicals Div., Union Carbide & Carbon Corp. ..... 168
Cargille Co., R. P. ..... 288
Carman, Everett F. ..... 294
Ce'anese Corp. of America ..... 230
Chemical Construction Corp. ..... 251
Chemical & Process Machinery Corp. ..... 292
Chemical Service Corp. ..... 288, 293
Church & Dwight, Inc. ..... 289
Claflin, Alan A. ..... 290
Clark Microanalytical Lab. ..... 294
Coal Chemical Sales Div., United States Steel Corp. ..... 161
Colburn Laboratories, Inc. ..... 294
Commercial Solvents Corp. ..... 174
Consolidated Products Co., Inc. ..... 291
Continental Can Co. ..... 259
Cowles Chemical Co. ..... 221
C. P. Chemical Solvents, Inc. ..... 290
Croll-Reynolds Co. ..... 260
Crosby Chemicals, Inc. ..... 246

Davison Chemical Corp. ..... 163
Demo Laboratories ..... 294
Diehl & Co., William ..... 286
Doe & Ingalls, Inc. ..... 290
Dow Chemical Co. ..... 162, 217
Dunkel & Co., Paul A. ..... 285
Du Pont de Nemours & Co., E. I. ..... 231

Eastern Color & Chemical Co. ..... 293
Einer & Amend ..... 269
Equipment Clearing House, Inc. ..... 291
Esso Standard Oil Co. ..... 277
Evans Research & Development Corp. ..... 294

Fairmount Chemical Co., Inc. ..... 299
Fine Organics, Inc. ..... 284
First Machinery Corp. ..... 292
Fisher Chemical Co. ..... 299
Fisher Scientific Co. ..... 269
Food Research Laboratories, Inc. ..... 294
Foote Mineral Co. ..... 210
Fritzsche Brothers, Inc. ..... 232

Gelb & Sons, Inc. ..... 291
General American Transportation Corp. ..... 287
General Biochemicals, Inc. ..... 295
General Chemical Div., Allied Chem. & Dye Corp. ..... Inside Back Cover
General Magnesite & Magnesia Co. ..... 222
Glycerine Producers Association ..... 219
Gravelle Lab., The ..... 294
Greeff & Co., R. W. ..... 299
Gross & Co., A. ..... 283

H & M Co. ..... 290
Hardesty Chemical Co., Inc. ..... 157
Harshaw Chemical Co., The ..... 281
Heyden Chemical Corp. ..... 203
Hooker Electrochemical Co. ..... 241
Hunter, Fred L. ..... 294

Industrial Chemical Sales Div., West Virginia Pulp & Paper Corp. ..... 243
Innis, Speiden & Co. ..... 224
International Paper Co., Bagpak Div. ..... 261
Jacobs, Albert L. ..... 294

Kay-Fries Chemicals, Inc. ..... 271
Kessler Chemical Co., Inc. ..... 300
Kolker Chemical Works ..... 214
Koppers Co., Inc. ..... 171

# INDEX *of* ADVERTISERS


Lamex Chemical Corp. ... 260
LaPine Co., Arthur S. ... 290
Lincks, Inc., George H. ... 280
Lohse, Dr. Henry W. ... 295
Lucidol Div., Novadel-Agene Corp. ... 289

Machinery & Equipment Corp. ... 291
Mallinckrodt Chemical Works ... 209
Mann & Co., George ... 290
Marine Magnesium Products Corp. ... 284
Mathieson Chemical Corp. ... 156
McCutcheon, John W. ... 294
McKesson & Robbins, Inc. ... 226
Metalab Equipment Corp. ... 262
Metalloy Corp. ... 220
Meyer & Co., Charles A. ... 272
Millmaster Chemical Co. ... 242
Molnar Laboratories ... 294
Monsanto Chemical Co. ... 166, 167
Mutual Chemical Co. of America ... 159

National Aniline Div., Allied Chem. & Dye Corp. ... 211
National Box & Lumber Co. ... 258
National Technical Labs. ... 253
Natural Products Refining Co. ... 172
Niacet Chemicals Div., United States Vanadium Corp. ... 282
Northwest Laboratories ... 295

Oldbury Electrochemical Co. ... 262
Olin Laboratories, R. R. ... 295
Oronite Chemical Co. ... 237

Pacific Coast Borax Co. ... 242
Patterson-Kelley Co., Inc. ... 254
Personnel Directory ... 300
Perry Equipment Corp. ... 291
Peters Chemical Co. ... 290
Pfizer & Co., Inc., Chas. ... 213
Phelps Dodge Rfg. Corp. ... 299
Pittsburgh Coke & Chemical Co. ... 223
Powell Co., Wm. ... 255
Pressed Steel Tank Co. ... 247

Raymond Bag Corp. ... 303
Reilly Tar & Chemical Corp. ... 238
Rosenthal Bercow Co., Inc. ... 300

St. Regis Paper Co. ... 257
Sargent & Co., E. H. ... 296
Sauereisen Cements Corp. ... 290
Scrutchfield, Paul H. ... 294
Seil, Putt & Rusby, Inc. ... 295
Sharples Chemicals, Inc. ... 233
Shell Chemical Corp. ... 239
Sindar Corp. ... 240
Snell, Inc., Foster D. ... 218, 294
Solvay Sales Div., Allied Chem. & Dye Corp. ... Inside Front Cover
Spencer Chemical Co. ... 268
Starkweather Co., Inc., J. U. ... 290
Stauffer Chemical Co. ... 265
Superior Air Products Co. ... 292

Tennessee Eastman Corp. ... 225
Tennessee Corp. ... 297
Tennessee Products & Chemical Corp. ... 235
Texas Gulf Sulphur Co. ... 274
Titanium Alloy Mfg. Co. ... 267
Titlestad Corp., Nicolay ... 266
Tomsett Associates ... 293
Truland Chemical & Engineering Co., Inc. ... 293

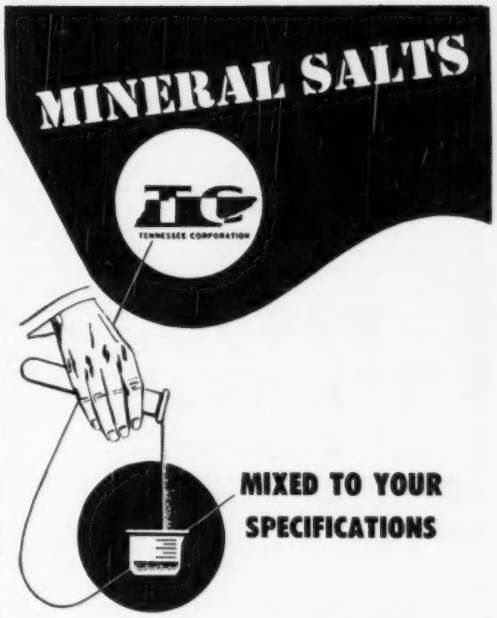
Udy, Marvin J. ... 295
Union Bag & Paper Corp. ... 160
Union Carbide & Carbon Corp., Carbide & Carbon Div. ... 168
U. S. Potash Co., Inc. ... 285
United States Steel Corp., Coal Chemical Sales Div. ... 161

Victor Chemical Works ... 228, 236
Virginia-Carolina Chemical Corp. ... 245

Welch, Holme & Clark ... 158
Westvaco Chemical Div., Food Machinery & Chem. Corp. ... 155

Witco Chemical Co. ... Back Cover
Wyandotte Chemicals Corp. ... 215, 278






We are in a position to supply large or small orders of most any mineral salts that you desire.

**One of the nation's foremost producers of agricultural chemicals and soluble mineral salts.**

- **COPPER SULPHATE**
- **ZINC SULPHATE**
- **MANGANESE SULPHATE**
- **COPPER CARBONATE**

**For complete information, Write the Tennessee Corp., Grant Bldg., Atlanta, Ga., or Lockland, Ohio.**

TENNESSEE TC CORPORATION
Atlanta, Georgia — Lockland, Ohio

# FROM WHERE WE SIT

*by "DOC"*

WE GOT A BIG KICK out the cartoon shown below when we first saw it at Fansteel's booth at the chem show. The company graciously granted us permission to reprint it, and now our conscience pricks us because we left the "commercial" off the caption—something about how the engineer's job is easier if he uses tantalum equipment. It appears to us, though, that he won't have time to use any equipment at all—what with his multifarious metaphorical activities.

AFTER TEN GLASGOW PEOPLE died as a result of drinking methyl alcohol stolen from a local chemical works, a doctor warned the employees that methyl alcohol "was slower in action than ethyl alcohol, buts its action lasted longer."

We suppose it's not stretching things a bit to admit that forever is a long time!

ANY DAY NOW we expect Du Pont to come out with Dr. Greenewalt's Old-Fashioned Indian Herb Remedy, "Evitagrup" (spell it backwards). Taking a leaf from "Serutan," its new fire-retardant composition is called "Erifon" (spell it backwards).

WE EXPECT OUR OFFICE—set here midst the teeming traffic of New York—to be quieter when more Kaisers and Frazers are on the streets. We have just been reading about the new K-F "supersonic" engine which, unless Henry J. is playing fast and loose with scientific terminology, indicates that the new motor is built along the lines of these silent dog whistles pitched beyond the range of the human ear. Either that or his cars will zip by at Mach 1 or better, and the sound of a traffic cop's whistle will never catch up with them. Mayhem in Manhattan!

EVERY ONCE IN A WHILE things get crowded in our office. Then we take off a day or two from our appointed tasks and throw things away—to make room, temporarily at least, for the flood of books, reports, memoranda, etc., that we can't throw away yet. Our latest exploration into the nether regions of our morgue unearthed some 12-year-old pages from the *New Yorker*, on which the author examines with interest the then-current *Thirteenth Annual Chemical Buyer's Guide*.

"Phosphoric acid," he writes, "is something the stomach could hardly get along without. Find me a jelly, a mineral water, a flavoring essence which is made without. The fact that it is also used in fireworks and fertilizers adds romantic interest."

Describing the compilation as a sort of "Wild Animals I Have Known" of the chemical world, he professes amazement that white arsenic "is used to prevent the decomposition (possibly even the digestion) of vegetables. It will preserve hide, yours or any other, very well. Here, too, is a curious note. Arsenic is used in treating hair for felt hats."

His critique in the final paragraph: "a very fascinating work."

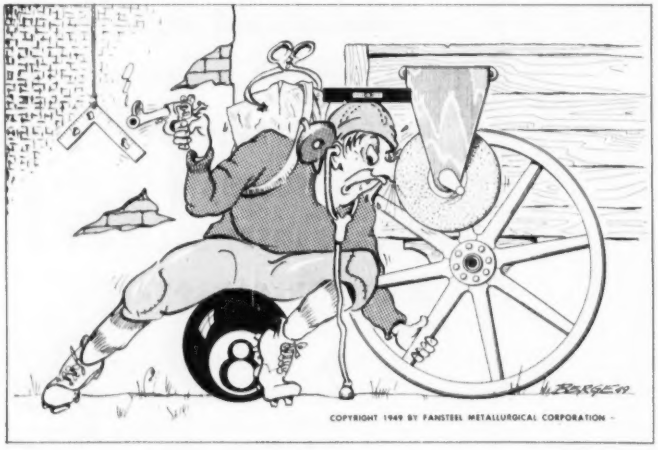
DURING OUR STUDY of chemistry we picked up a fair knowledge of German, squeaked through a reading exam in French, and later studied scientific Russian until it got to be too much for us. We never thought, though, that we'd have trouble with scientific English—that is, until we ran across the following excerpt from a paper by a professor:

"The historical viewpoint of the present fission, and the coming polyprocess nuclear technology, is that it is an additional integrative step in the continued industrial complexing of the growing productional aspect of emergently developing Western civilization." We tried to translate that into Basic English, but we got tangled up in "polyprocess." But what really got us was his lamenting the failure of professional scientists to summarize their work themselves for public information services: "by leaving that task to harried editorial workers who are not the specialists they themselves are, there is a transfer of oversimplification to the public attention."

Okay, Mac, so we're harried and don't know from nothing and make things too simple. Haw!

CALIFORNIANS run a close second only to Texans, in our book, for claiming the Biggest, the Most, the Best. We hardly envy their dubious distinction, however, of having the largest number of statutes enacted in 1949—2,282, to be exact. Must be a mighty rambunctious bunch of critters to need that many legal restraints!

A NEWS NOTE tells us that "this plant plans to use bauxite from a different source . . . for alumni production." Ah, so *that's* what these durable alumni are made of that one sees at the campus night spots during Homecoming weekend! We had thought they were made by a fermentation process.




**"The Chemical Engineer of 1950 must do a lot of things in order to accomplish what his associates say about him. He must keep a level head and at the same time maintain his reputation as a square shooter. While he is doing this, he must be on the ball while his eye is on the ball, his shoulder to the wheel and his nose to the grindstone. Keeping both his feet on the ground, The Chemical Engineer of 1950 must be on his toes, his back to the wall and his ear to the ground because he knows he is supposed to keep cool and always operate as a member of a team."**

# FAIRMOUNT CHEMICALS

- HYDRAZINE BASE
- HYDRAZINE HYDRATE 85% 100%
- HYDRAZINE SULFATE COMMERCIAL and C.P.

Use: Manufacture of intermediates for dyes and pharmaceuticals. Hydrazine Base has solvent properties similar to liquid ammonia.

- SEMICARBAZIDE HYDROCHLORIDE COM'L. and C.P.

Use: Isolation of ketones and aldehydes, forming well-defined crystalline compounds.

- SODIUM AZIDE
- SODIUM CYANATE
- IODIC ANHYDRIDE
- IODIC ACID
- LIGHT SENSITIVE DIAZO SALTS
- DYE COMPONENTS

Use: The stabilized Diazo Salts are used together with the Dye Components for coating light sensitive diazo type papers.

FAIRMOUNT CHEMICAL CO., INC.

136 Liberty Street New York 6, N. Y.



*The Standard of Quality*

# COPPER SULPHATE

99+% PURE

ALSO *Nickel Sulphate · Selenium*

*Tellurium · Z-C Brand Zinc Sulphate*

PHELPS DODGE REFINING CORPORATION

*Electrolytic Refiners of Copper*

40 Wall St., N.Y. 5, N.Y. • 230 N. Michigan Ave., Chicago 1, Ill.



# Greeff

## NORIT ACTIVATED CHARCOAL

USP XIII

*Selling Agents for*

AMERICAN NORIT CO., INC.

Plant at Jacksonville, Fla.

R. W. GREEFF & CO., INC.

10 ROCKEFELLER PLAZA, NEW YORK, N. Y.

TRIBUNE TOWER, CHICAGO, ILLINOIS



## PARA-AMINO BENZOIC ACID and SODIUM SALT

Purified

*Spot • Contract*

Manufactured by

GAMMA CHEMICAL CORP.

Newark, N. J.

*Sole Sales Agents*

*Fisher* CHEMICAL COMPANY, Inc.

60 E. 42nd STREET, NEW YORK 17, N. Y. • MUrray Hill 2-2587-8-9

*Cable Address: PHARCHEM*

KESSCO PRODUCTS

CHEMICAL SPECIALTIES

**PLASTICIZERS**
Cellulose, Vinyls, Rubber, Resins

**SOFTENERS**
Leather, Rubber, Textile, Paper

**EMULSIFIERS**
Cosmetics, Foods, Pharmaceuticals,
Petroleum, Agriculture Insecticides

EST 1921

KESSLER CHEMICAL CO., INC.
STATE ROAD and COTTMAN AVE. • PHILADELPHIA 35, PA.

DRUGS CHEMICALS OILS WAXES

ARSENIC WHITE
CRESYLIC ACID
NAPHTHALENE
ORTHO DICHLOROBENZENE
PARA DICHLOROBENZENE
THALLIUM SULFATE

ROSENTHAL BERCOW CO., Inc.
25 EAST 26th ST. NEW YORK 10, N. Y.
CABLE ADDRESS "RODRUG"

*Are You Looking For . . .*

CI

BENZYL CHLORIDE
TITANIUM DIOXIDE
PAINT DEODORANTS
DEFOAMING AGENTS
HYDRAULIC FLUIDS

*Buyers Guide*

**THE FIRST AND ONLY PERSONNEL DIRECTORY**

That has ever been published giving the *complete* key PERSONNEL of most of the major Chemical Companies and most of the larger Oil Refineries, alphabetically listed by States.

**NOT JUST ANOTHER DIRECTORY**

But one that gives you the key men's names and their positions in these Industries, from the President to the Chief Engineer, including the Purchasing Agent and Chief Chemist. This Directory is worth many times its low cost as a *mailing list alone*, more than 14,000 actual Key men's names, one hundred and thirty-five pages of the best information that it is possible to obtain.

**PRICE $20.00 PER COPY**

*Only Limited number left* — *Send in your order today to*

**PERSONNEL DIRECTORY**

1265 Commercial Trust Building. — Philadelphia 2, Penna.

# *Abstracts of United States Patents*

**A Complete Checklist Covering Chemical Products and Processes**

**Printed copies of U. S. patents are available from the Patent Office at 25 cents each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trade-marks.**

***U.S. Patents from Official Gazette—Vol. 626, Nos. 3, 4 (Sept. 20-27) and Vol. 627, Nos. 1, 2, 3 (Oct. 4-18)***

## *Coatings*

**Liquid coating composition** comprising a volatile organic solvent selected from the group consisting of ketones, alcohols and esters, and a solute composed of the thermoplastic, heat-convertible resinous composition derived by refluxing monostyrene with monoallyl maleate in acetone in the presence of benzoyl peroxide. No. 2,482,087. Westinghouse Electric Corp.

**Resinous coating composition** comprising the reaction product obtained by heating a partial polymer consisting of the reaction product of a dicarboxylic acid with a member of the group consisting of a primary diamine-dicarboxylic acid linear polyamide forming salt and a linear polyamide obtained by the polymerization of the said salt, a monohydric alcohol, formaldehyde and material selected from the group consisting of urea, guanidine and an amino triazine. No. 2,482,252. E. I. du Pont de Nemours & Co.

**Coloring a hard, dense, thin hydrated oxide protective coating** upon surfaces of articles of magnesium and magnesium-base alloys, the steps which comprise immersing the coated article in a solution consisting of water, a water-soluble dye, an alkali, boric acid, a water-soluble chromate selected from the group consisting of sodium, potassium, and ammonium chromate. No. 2,482,728. Dow Chemical Co.

**Forming black surface conversion coatings on zinc,** consisting in dipping the zinc in a water solution consisting essentially of hexavalent chromium, an activating acid radical of the group consisting of sulphate radicals and fluoride radicals, and silver ion. No. 2,483,510. United Chromium, Inc.

**Protective coating for surfaces,** consisting of water as a vaporizable vehicle, shellac to form the body of the coating, aqueous ammonia as a solvent for the shellac, the dissolved shellac forming an emulsion in the water, borax to promote emulsification of the water and shellac-solution mixture, oleic acid as a plasticizer for the emulsion, ethyl alcohol to inhibit saponification of the oleic acid, and formaldehyde as a wetting agent for the surfaces to be coated. No. 2,483,598. Charles F. T. Schrank.

**In making a flowable, stable, storable, non-tacky, weather-resistant coating composition,** forming an oil-in-water type emulsion having water as its continuous phase and having as its dispersed phase a water-insoluble, water-dispersible, organic, thermoplastic material, a filler and a polyvalent metal fluosilicate, and a water-soluble alkali metal inorganic salt of the type which reacts in aqueous solution with water-soluble polyvalent metal fluosilicates to form a water-insoluble alkali metal fluosilicate and a water-insoluble polyvalent metal salt, and forming said water-in-soluble alkali metal fluosilicate and water-in-soluble polyvalent metal salt in situ in said coating composition. No. 2,483,836. Stancal Asphalt & Bitumuls Co.

**Coating surfaces** by passing one of a group consisting of trimethyl boron, triethyl boron and tripropyl boron in the vapour phase and under reduced pressure into contact with the surface to cause boron to be deposited thereon in a thin film. No. 2,484,519. Graham Robert Martin.

**Lead coating a metal article** by electrodepositing a coating of lead and closing pin holes in the coating and increasing the resistance of the article to corrosion by wiping said coating with soft, fibrous material while the coating is in a mineral oil. No. 2,484,540. Republic Steel Corp.

## *Detergents*

**Detergent composition** consisting of a fatty acid detergent soap normally tending to form an insoluble precipitate in hard water and an acylated diethanolamine condensation product having a predominant proportion of the diethanolamine product with a single replaceable hydrogen of the diethanolamine substituted with a higher fatty acid acylating group having from about 8 to 14 carbon atoms, said condensation product being obtained by reacting an excess of diethanolamine with a higher fatty acid acylating substance having fatty acid groups of about 8 to 14 carbon atoms. No. 2,483,253. Swift & Co.

**In the manufacture of soap** a continuous process for the purification of a glycerinated soap obtained in the more concentrated liquid phase known as "neat" soap comprising washing the soap by a continuous circulation with a solution of sodium chloride. No. 2,485,204. Union Francaise Commerciale et Industrielle.

**Continuous manufacture of soap** comprising forming an emulsion of the type "water in oil" between fatty glyceridic materials and an alkaline lye wherein the quantity of soda placed in reaction is slightly above the quantity necessary for a complete saponification of said fatty materials. No. 2,485,205. Union Francaise Commerciale et Industrielle.

## *Dyes & Pigments*

**In the manufacture of water-soluble phthalocyanine derivatives** containing ternary sulphonium salt groups, the steps which comprise hydrolysing in an aqueous solution of an alkali metal hydroxide, a compound of the formula R $(CH_2X)_n$, wherein R is the radical of the phthalocyanine compound formed by removing n atoms of hydrogen from the molecule, n is an integer greater than 1 and X is an isothiouronium salt group, and alkylating the resulting alkali metal mercaptide to give a compound of the formula R $(-CH_2SAlk)_n$, wherein Alk is an alkyl group and R and n have the significance given above. No. 2,482,172. Imperial Chemical Industries Ltd.

**Merocyanine** dyes. No. 2,482,532. General Aniline & Film Corp.

**Purification of vat dyestuffs.** No. 2,483,238. American Cyanamid Co.

**$2PbO \cdot PbHPO_3 1/2H_2O$,** a basic lead phosphite composition, useful as a pigment. No. 2,483,469. National Lead Co.

**In preparing a sulfur dyestuff** by reducing copper phthalocyanine tetrasulfonylchloride with a metal in the presence of a mineral acid and subsequently oxidizing the resulting copper mercaptophthalocyanine to the disulfide, the improvement which comprises conducting the reduction with iron. No. 2,484,300. General Aniline & Film Corp.

**Polymethin dyes.** No. 2,484,503. Eastman Kodak Co.

**Meso alkyl mercapto substituted carbocyanine dyes.** No. 2,484,536. Gevaert Photo-Producten N. V.

**1-Amino-4-(nitro-2'-hydroxy)-anilino-antraquinone-2-sulfonic acids,** the salts thereof and their chrome derivatives as vat dyestuffs. No. 2,485,121. General Aniline & Film Corp.

**Manufacture of a metal-free phthalocyanine** by heating an orthoarylene dicyanide of the benzene series in an inert organic solvent and in the presence of an organic nitrogenous base selected from the group consisting of cyclohexylamine, piperidine and alpha-pipecoline.. No. 2,485,167. E. I. du Pont de Nemours & Co.

**Manufacture of a metal-free phthalocyanine** by heating an orthoarylene dicyanide of the benzene series in an inert organic solvent and in the presence of an organic nitrogenous base selected from the group consisting of piperidine and the pipecolines, and in the further presence of glycol and of an alkali-metal carbonate. No. 2,485,168. E. I. du Pont de Nemours & Co.

**Manufacture of a dyestuff mixture** for dyeing acetate rayon according to the dispersion dyeing method, comprising reacting a mixture of α:α-dihydroxy-anthraquinones consisting of a single anthraquinone nucleus containing the hydroxyl groups in different benzene nuclei and two nitro groups in such positions as are occupied in direct nitrating reactions, with an arylamine under conditions for exchanging only part of the said nitro groups for arylamino radicals, and reducing the remaining part of the nitro groups to amino groups. No. 2,485,197. Ciba Ltd.

## *Explosives*

**Preparing a high density explosive composition** including trinitrotoluene, trinitrophenyl-methylnitramine and cyclotrimethylenetrinitramine, comprising forming a suspension of cyclotrimethylenetrinitramine in a liquid melt of trinitrotoluene in which trinitrophenyl-methyl-nitramine is dissolved, and thereafter solidifying. No. 2,482,089. U. S. A. represented by the Secretary of War.

**Preparing a high density explosive composition** including trinitrotoluene, trinitrophenyl-methyl-nitramine and ethylenedinitramine, comprising forming a suspension of ethylenedinitramine in a liquid melt of trinitrotoluene in which trinitrophenylmethyl-nitramine is dissolved, and thereafter solidifying. No. 2,482,090. U. S. A. represented by the Secretary of War.

**Preparing a high density bursting charge** including trinitrotoluene, pentaerythritol tetranitrate, and ethylenedinitramine, comprising forming a suspension of ethylenedinitramine in a liquid melt of trinitrotoluene in which pentaerythritol tetranitrate is dissolved, introducing the said suspension into a cavity intended to carry the bursting charge, and solidifying. No. 2,482,091. U. S. A. represented by the Secretary of War.

**Making an explosive composition** by mixing paraffin and gasoline, distilling this mixture to effect a liquid distillate consisting of a solution of paraffin and gasoline, drying a portion of potassium chlorate by a gentle heating, mixing pulverised charcoal with the dried potassium chlorate, then impregnating this mixture with said paraffin-gasoline distillate and slowly drying the resulting impregnated material; drying a second portion of potassium chlorate by a gentle heating, impregnating this portion of potassium chlorate with a volatile solvent solution of manila copal resin, and drying; then mixing the dried resin-impregnated potassium chlorate with the distillate impregnated potassium chlorate and charcoal, adding a plasticized nitrocellulose binder and slowly drying the bonded mixture. No. 2,483,589. Sidney J. McClung.

**Preparing propellants** by contacting fluffy fibrous nitrocellulose free of water with a solution of cobaltous rosinate in a mixture of carbon tetrachloride and petroleum ether, to effect adsorption of cobaltous rosinate, separating said fibrous nitrocellulose, drying, and thereafter incorporating in a propellent mix the fibrous nitrocellulose containing the adsorbed cobaltous rosinate. No. 2,484,023. Charles P. Fenimore, Lester P. Kuhn and Joseph H. Frazer.

**Composition of matter** comprising nitrostarch, a volatile solvent therefor, an anti-gelling agent comprising a monohydric alcohol containing less than 6 carbon atoms, and an ignition compound selected from a group consisting of lead styphnate, monobasic lead 4:6 dinitroorthocresylate, monobasic lead picramate, monobasic lead 3:5 dinitrobenzoate, lead nitrato-bis-basic-lead 4:6 dinitro-ortho-cresylate, normal lead 2 nitroresorcinate and monobasic lead 2 nitro resorcinate. No. 2,484,131. Atlas Powder Co.

## *Inorganic*

**Reactivating a copper contact mass** and removing metal chloride contaminants which comprises subjecting said mass to the action in the absence of appreciable amounts of oxygen of a solution of sodium chloride. No. 2,482,289. E. I. du Pont de Nemours & Co.

**Producing a catalytic structure for the decomposition of hydrogen peroxide** which comprises cathodically electrodepositing manganese on an iron support by plating with graphite anodes from an aqueous plating bath containing manganese acetate quadrihydrate, ammonium acetate and ammonium hydroxide, and then cathodically electrodepositing manganese dioxide on said manganese surface by plating with steel anodes from an aqueous electrolytic plating solution prepared by dissolving potassium carbonate and potassium permanganate in water, and passing an electric current through said solution. No. 2,482,308. E. I. du Pont de Nemours & Co.

**Barium halophosphate phosphor,** consisting of the fired reaction product of barium phosphate, a barium halide selected from the group consisting of the fluoride, chloride and fluorochloride of barium and uranium activator. No. 2,482,450. General Electric Co.

**Reducing the viscosity of sulfur** by resin acids. No. 2,482,574. Arthur D. Little, Inc.

**Reduction of viscosity of molten sulfur** by means of phenolic compounds. No. 2,482,590. Arthur D. Little, Inc.

**Continuous process for the production of ammonium sulfate** and the ex-

traction of ammonia from low-pressure gases containing the same obtained by the destructive distillation of coal. No. 2,482,643. Allied Chemical & Dye Corp.

**In generating nitrogen dioxide** by reacting sulfur dioxide with aqueous nitric acid, the step of passing gaseous sulfur dioxide into a liquid body of aqueous nitric acid initially containing not less than 40% $HNO_3$ and discontinuing the reaction when not in excess of one-half of the $HNO_3$ initially present has been consumed, whereby the generated nitrogen dioxide is free from other oxides of nitrogen. No. 2,483,199. Mathieson Chemical Corp.

**In the purification of manganese ammonium sulphate solutions** for electrolysis which includes the steps, addition of sulphide ion to precipitate heavy metals, filtration to remove most of the impurities as precipitated sulphides, and treatment with highly adsorptive material to further purify the solution, the improvement which consists in using as the highly adsorptive material, a kaolin dispersion stabilized with a metal hydroxide, selected from the class consisting of iron, aluminum and chromium hydroxides. No. 2,483,287. Crimora Research & Development Corp.

**Silver acetylide**, $Ag_2C_2.6AgNO_3$. No. 2,483,440. Koppers Co., Inc.

**Preparation of homogeneous plural hydrogels** comprising silica, by preparing a silica sol, allowing to thicken, adding from the group consisting of alumina and beryllia sols a secondary sol whereby common precipitation of the sols is simultaneously secured to form a homogeneous plural hydrogel. No. 2,483,782. Standard Oil Development Co.

**In manufacture of silica gel by chemical interaction of silicate and acid** in an acidic aqueous reaction mixture followed by washing and drying the improvement which consists in introducing sodium silicate solution in atomized form into a turbulently agitated sulfuric acid solution. No. 2,483,868. International Minerals and Chemical Corp.

**Reacting a compound selected from the group consisting of carbonates and hydroxides of sodium and potassium** with ferrophosphorus to yield the corresponding alkali metal and condensing the resulting alkali metal vapor by cooling. No. 2,484,266. Monsanto Chemical Co.

**In manufacture of chlorine dioxide**, reacting an aqueous solution of an inorganic chlorate with HCl in a reaction zone, passing the reacted chlorate solution from said reaction zone to an electrolytic cell, increasing the chlorate content, then returning the fortified solution to the reaction zone for further reaction with Hcl. No. 2,484,402. Brown Co.

**Purifying and revivifying a solution of metal sulphates in sulphuric acid** comprising causing said hot solution with precipitated metal sulphates to ascend a barometric column under high vacuum so as to overflow from the top thereof, evaporating vapors from said overflowing solution and absorbing said vapors with sulphuric acid to cool said overflowing solution, collecting said overflowing solution and separating the precipitated metal sulphates and causing said overflowing solution from which the precipitated metal sulphates have been separated to flow around said column in a direction counter to the unseparated solution ascending therein to cool said unseparated solution. No. 2,484,799. Norman Swindin.

**Producing a catalytically active body** by reacting a bentonite clay with a mineral acid, separating the resultant solution from the clay, further reacting the clay with an aqueous solution of a mineral acid, separating the resultant solution from the clay, washing the clay, and then drying it. No. 2,484,828. Great Lakes Carbon Corp.

**Recovering aluminum chloride** from a liquid hydrocarbon-aluminum chloride complex, by passing a stream of such a liquid into a decomposition zone to effect a decomposition of said liquid, introducing a stream of gaseous butane into said zone effecting within said zone a continuous grinding of solid products resulting from decomposition of said liquid, removing resulting vapors and comminuted solid material, separating solid aluminum chloride. No. 2,485,050. Phillips Petroleum Co.

**Treating gypsum** obtained as a by product of phosphoric acid manufacture by the sulfuric acid process to remove objectionable impurities and increase oil absorptivity by subjecting the by-product gypsum to attrition in the presence of aqueous sulfuric acid. No. 2,485,164. E. I. du Pont de Nemours & Co.

**Recovering tungsten carbide** from a sintered mass thereof with cobalt, wherein the mass is heated to 1800° C. whereby some of the cobalt bond is exuded and the mass is made porous, the porous mass being then cooled and treated with acid for the removal of the cobalt bond. No. 2,485,175. George Joseph Trapp.

**Carbonating lime** and of separating the same from magnesia. No. 2,485,350. New England Lime Co.

**Producing nitrogen oxide** by introducing a gaseous medium consisting of nitrogen gas and oxygen into a gas discharge apparatus. No. 2,485,476. Koppers Co., Inc.

**Producing nitrogen oxide** from a nitrogen-and-oxygen-containing gaseous medium in a gas discharge apparatus. No. 2,485,477. Koppers Co., Inc.

**Electrochemically producing nitrogen oxide** in the presence of tantalum electrodes. No. 2,485,478. Koppers Co., Inc.

**Producing nitrogen oxide** by introducing a gaseous medium consisting of nitrogen gas and oxygen gas into a gas dischare apparatus having an assemblage of at least three separately spaced electrodes. No. 2,485,479. Koppers Co., Inc.

**Producing nitrogen oxide** by introducing into a reactor a nitrogen-and-oxygen-containing medium which produces nitrogen oxide upon treatment with crossed electrical discharges. No. 2,485,480. Koppers Co., Inc.

**Producing nitrogen oxide** by introducing a gaseous medium consisting of nitrogen gas and oxygen gas into a gas discharge apparatus having an assemblage of at least three separately spaced electrodes. No. 2,485,481. Koppers Co., Inc.

## *Metals*

**Producing soluble vanadium compounds** from vanadium bearing iron ores comprising mixing the granulated ore with an alkali metal compound to react with the vanadium oxide content of the ore and a porous carbon material selected from the group consisting of charcoal and coke and heating first with a limited supply of air to effec ta preliminary reduction of the metal content of the ore other than vanadium to free the unreduced vanadium oxide from its spinel-like compound with the iron, then heating the mixture with a free supply of air to oxidize both the vanadium to its higher oxide to form vanadates by reaction with the alkali compound and the iron to iron oxide ($Fe_2O_3$), and leaching the soluble vanadate from the ore. No. 2,482,311. Christiania Spigerverk.

**Acid copper plating solution** consisting of copper sulfate, sulfuric acid, and an addition agent consisting of tri-isopropanolamine. No. 2,482,354. Radio Corp. of America.

**Making copper and silver screen catalyst** by treating copper and silver screens in an oxidizing atmosphere, alternately stacking at least a portion of the copper and silver screens so that there are not more than six of either copper or silver screens adjacent one another, and compressing the screens so stacked to such an extent that the original height of the stack is reduced by 2-10%. No. 2,482,742. Eastman Kodak Co.

**Froth flotation of iron impurities from feldspar** in which a pulp of the ore is floated with an anionic promoter to produce an enriched feldspathic-materials tailing and a feldspathic-materials concentrate is floated from said tailing with a cationic promoter. No. 2,483,192. American Cyanamid Co.

**In the beneficiation of silicious iron-bearing material** by a froth flotation procedure in which silicious gangue particles are floated from a pulp of the iron mineral, by the aid of a readily water-dispersible cationic collector, the improvement which consists in effecting the flotative separation in a non-acid pulp circuit, in the presence of a modified starch product not containing more than 2% of water-soluble sugars and being substantially free from raw starch. No. 2,483,890. Erie Mining Co.

**In beneficiating those barite ores** which produce sufficient slimes to adversely effect froth flotation, the improvement which comprises: forming an aqueous pulp of the ore; subjecting the pulp to froth flotation in the presence of a promoter selected from the group consisting of the higher fatty acids, talloel, their sodium, potassium, and ammonium soaps and mixtures thereof. No. 2,483,970. American Cyanamid Co.

**Starring mixture** for use in antimony smelting which comprises sodium monosulfide and potassium carbonate. No. 2,484,976. Chung Yu Wang.

**Froth flotation of copper sulfide ores** with lignin sulfonates. No. 2,485,083. American Cyanamid Co.

**Quenching oil** consisting of alkyl-substituted polynuclear aromatic hydrocarbons. No. 2,485,103. Socony-Vacuum Oil Co., Inc.

**Nickel electroplating bath** addition agent comprising a nickel electrodeposit brightening agent consisting of a sulfonated aryl aldehyde and a sulfuric acid reaction product of an alkyl-substituted-mercapto-dihydropyrimidine, resulting from reacting an alkyl-substituted-2- mercapto dihydropyrimidine with concentrated sulfuric acid with accompanying evolution of sulfur dioxide. No. 2,485,149. Seymour Mfg. Co.

**Stopping-off composition** for selective carburisation of metal articles comprising a liquid vehicle adapted to dry to an adherent hard film having suspended therein as pigment a metal powder consisting of copper and tin together with a lead compound selected from the group consisting of lead oxide, lead hydroxide and basic lead carbonate. No. 2,485,176. Imperial Chemical Industries Ltd.

**Cold plating aluminum-containing metals** by wetting the surface with the solution reaction product of the intermixture of anhydrous antimony trichloride with a brine selected from a group consisting of sodium chloride, potassium chloride, and calcium chloride brines to induce a surface reaction in which metallic antimony forms on the aluminum surface. No. 2,485,182. Arthur Arent Labs., Inc.

**Electrodepositing lead** on copper from a nitrate bath. No. 2,485,258. Standard Oil Development Co.

**Descaling a ferrous metal** comprising an aqueous solution containing HCl, an organic nitrogen base soluble in hydrochloric acid selected from the group consisting of the aromatic and heterocyclic nitrogen bases, and a water-soluble thiocyanate. No. 2,485,526. Dow Chemical Co.

**Descaling a ferrous metal surface** comprising an aqueous solution containing HCl, a corrosion-modifying agent selected from the group consisting of urea, thiourea, diethylthiourea, diisopropyl-thiourea, dibutyl-thiourea, ethylenethiourea, sym.-di-o-tolylthiourea, sym.-di p-tolylthiourea, and sym.-diphenylthiourea, and a water-soluble inorganic thiocyanate. No. 2,485,529. Dow Chemical Co.

## *Organic*

**Production of cyclohexane** free of benzene from naphthenic gasoline by separating a fraction comprising methylcyclopentane and cyclohexane in admixture with close boiling open chain paraffins and benzene, subjecting said fraction to extractive distillation to separate a cyclohexane and a methyl cyclopentane fraction. The latter is the catalytically isomerized to cyclohexane. No. 23,151. Shell Development Co.

**Synthesizing the homologues of thiophene** having at least one nuclear hydrogen replaced by an alkyl group by reacting a thiophene compound in the presence of concentrated sulfuric acid and sufficient of a non-reactant diluent of the class consisting of water and acetic acid to provide a solution of sulfuric acid having a concentration of about 45 to about 75%. No. 2,482,084. Socony-Vacuum Oil Co., Inc.

**Preparing an N4-acylsulfathiazole** which comprises heating an anhydrous 3-(N4-acylsulfanilyl)-2-imino-4-thiazoline. No. 2,482,085. Monsanto Chemical Co.

**3-bromo-tetrahydro-4-trichloromethylthiophene-1,1-dioxide** from the adduct of butadiene sulfone and bromotrichloromethane and partial dehalogenation thereof. No. 2,482,088. U. S. Rubber Co.

**Isomerizing normal butane** in the presence of a catalyst consisting of a binary mixture of aluminum chloride and an alkali metal chloride. No. 2,482,145. Compagnie Francaise de Raffinage.

**Water-soluble acyl derivatives of 4,4'-diamonodiphenylsulfone** where the acyl radical is a number of the group consisting of capronyl, heptoyl, octanoyl, pelargonyl and decanoyl. No. 2,482,169. Equitable Life Assurance Society of the U. S.

**Making a styrene compound of the group consisting of styrene and chlorostyrenes** by passing the vapors of one of the group consisting of acetophenone and ring-substituted chloroacetophenones and an aliphatic monohydric alcohol capable of dehydrogenation to a carbonyl compound over a dehydrating-dehydrogenating catalyst, and recovering from the reaction products a styrene compound and an aliphatic carbonyl compound. No. 2,482,207. Carbide and Carbon Chemicals Corp.

**Making a styrene compound** of the group consisting of styrene and chlorostyrenes by passing the vapors of one of the group consisting of acetophenone and ring-substituted chloroacetophenones and an aliphatic monohydric alcohol capable of dehydrogenation to a carbonyl compound over a silica gel catalyst at an elevated temperature. No. 2,482,208. Carbide and Carbon Chemicals Corp.

**Recovery of the hydrocarbon constituents** of gaseous mixtures including principally hydrogen and nitrogen with substantial proportions of the atmospheric rare gases which comprises cooling a compressed gaseous mixture with resultant formation of a condensate including constituents less volatile than hydrogen, rectifying the condensate to separate nitrogen from a liquid including the less volatile constituents and subjecting the liquid to an auxiliary rectification to separate argon and finally evaporating a more volatile fraction to leave a liquid concentrate containing krypton and xeon. No. 2,482,304. Air Reduction Co., Inc.

**Beta-cyclohexyl-alpha-alpha-dimethyl-alpha-amino ethane.** No. 2,482,377. Wm. S. Merrell Co.

**Making acetylene** by passing an ethylene-rich gaseous stream containing essentially hydrocarbons as reactants through a catalytic bed constituted by a highly extended mass of stainless steel containing at least 7% nickel and maintained at temperatures within the range of 1600 to 2500° F., continuously withdrawing the effluent and immediately quenching same with water. No. 2,482,438. Phillips Petroleum Co.

**3,3'-carboxymethylenebis- (4-hydroxycoumarin) ethyl ester.** No. 2,482,510. Spojene farmaceuticke zavody, narodni podnik.

**Manufacturing the ethyl ester of 3,3'-carboxymethylenebis-(4-hydroxycoumarin)** by condensing bezetetronic acid with glyoxlic acid ethyl ester ethyl alcoholate. No. 2,482,511. Spojene farmaceuticke zavody, narodni podnik.

**Condensing 3,3'-carboxymethylenebis-(4-hydroxycoumarin)** at elevated

temperature in the presence of hydrochloric acid as a dehydrating condensing agent with a lower aliphatic alcohol having a number of carbon atoms of one to four and thereby esterifying exclusively the carboxylic function of said 3,3'-carboxymethlenebis-(4-hydroxycoumarin). No. 2,482,512. Spojene farmaceuticke zavody, narodni podnik.

**Halogenated phenacylpyridines.** No. 2,482,521. American Cyanamid Co.

**Preparing phenolic materials** which comprises reacting a lignin substance with sodium chlorite in a hot, weakly acid, aqueous reaction mixture until the lignin goes into solution, acidifying the lignin solution, extracting the acidified mixture with a water-immiscible solvent and recovering the phenolic materials from the extract. No. 2,482,594. Institute of Paper Chemistry.

**Diallyl ester of isopropylidene** di(p-phenoxyacetic acid). No. 2,482,706. American Cyanamid Co.

**Production of a vinyl ether** by subjecting an acetal to thermal dissociation in the presence of vapour of a strong mineral acid as catalyst. No. 2,482,725. Distillers Co., Ltd.

**Heating a drying oil and a beta-unsaturated monohydric alcohol ester of a 1,2,3,6-tetrahydrophthalic acid** whereby the drying oil is improved as regards color-stability, gel time and drying time. No. 2,482,736. Montclair Research Corp.

**4,4'-isopropylidene bis-(2-isopropylphenol.)** 2,482,748. Dow Chemical Co.

**Purifying oleic acid** which contains polyunsaturated fatty acids by heating the oleic acid to a polymerizing temperature which is below the decomposition temperature thereof, in the presence of dissolved water, to polymerize polyunsaturated fatty acids, and subsequently treating the heated product at a reduced pressure to distill a purified oleic acid. No. 2,482,760. Emery Industries, Inc.

**Preparing an acid** having a plurality of carboxyl groups in the molecule which comprises heating a polyunsaturated fatty acid at an elevated pressure and a polymerizing temperature of at least about 260° C. in the presence of water sufficient to prevent decarboxylation during the said heating. No. 2,482,761. Emery Industries, Inc.

**Selective hydrogenation of arylnitroolefins** to obtain a composite reaction product comprising a mixture of 1-aryl-2-nitroalkanes; 1-aryl-2-oxoalkanes and 1-aryl-2-oxoalkane oximes; which comprises subjecting said arylnitroolefin to catalytic hydrogenation in the liquid phase in the presence of a noble metal catalyst selected from the group consisting of platinum and palladium. No. 2,483,201. Commercial Solvents Corp.

**Preparing alpha-naphthalene sulfonic anhydride** by reacting sulfur trioxide with naphthalene in a solvent selected from the group consisting of dimethyl sulfate, diethyl sulfate, phosphorus oxychloride and mixtures thereof. No. 2,483,213. American Cyanamid Co.

**Compound containing a five-membered heterocyclic nucleus** consisting of four nuclear carbon atoms and one sulfonyl radical wherein at least two of the nuclear carbon atoms of said heterocyclic nucleus are directly attached to alkyl radicals and wherein one of the nuclear carbon atoms of said heterocyclic nucleus is directly attached to the hydroxy radical, the remaining free bonds of the nuclear carbon atoms of said heterocyclic nucleus being directly attached to members of the group consisting of the hydrogen atom and the hydrocarbon radicals. No. 2,483,219. Shell Development Co.

**Esters of Penicillin S-dioxide.** No. 2,483,235. Merck & Co., Inc.

**Separation of primary, secondary, and tertiary alcohols** by azeotropic distillation in the presence of an azeotrope former comprising an oxygen ester selected from the group consisting of alkanol nitrates, nitrites, borates, carbonates, etc. No. 2,483,246. Union Oil Co. of Calif.

**Nicotinylamino - α,β - diphenyl - ethane.** No. 2,483,250. Ciba, Ltd.

**Nicotinylamino-α,β-diphenyl-ethane.** No. 2,483,250. Ciba.

**Laevo-gulosaccharo ascorbic acid.** No. 2,483,251. Merck & Co., Inc.

**In the preparation of hydroxylammonium salts of organic monocarboxylic acids,** the process which comprises reacting a hydroxylammonium salt of a mineral acid in a lower aliphatic alcoholic medium with a salt of an organic acid selected from the group consisting of ammonium salts and alkali metal salts of alkanoic acids, phenylalkanoic acids, and the halogen-substituted, hydroxyl-substituted, and keto-substituted derivatives thereof. No. 2,483,252. Commercial Solvents Corp.

**Manufacture of aromatic alcohols** which comprises preparing a mixture of an acid condensing agent comprising aluminum chloride, in an aromatic hydrocarbon, establishing and maintaining a vacuum and then introducing an alkylene oxide. No. 2,483,323. Kay-Fries Chemicals, Inc.

**Esters of phthalideneacetic acid.** No. 2,483,371. Monsanto Chemical Co.

**Reaction between silicon and the aryl halide component of a mixture** comprising an aryl halide and hydrogen chloride. No. 2,483,373. General Electric Co.

**1-methyl-3-(2,6,6-trimethyl-1-cyclohexene-1-yl)-propylamine and the acid addition salts thereof.** No. 2,483,381. Hoffmann-La Roche, Inc.

**Substituted ethylenes.** No. 2,483,392. Ciba Ltd.

**Bleaching dark oil and fat stocks** by treating said stock in the presence of a phosphoric compound selected from the group consisting of phosphoric acids and acid phosphates, and a compound liberating nascent oxygen in the presence of the said acidic compound and then treating the stock with a bleaching earth. No. 2,483,413. Lever Brothers Co.

**Making light colored soaps** from relatively darker stocks, by treating said stock in the presence of a phosphoric compound selected from the group consisting of phosphoric acids and acid phosphates, and a compound liberating nascent oxygen in the presence of said acidic compound under the treating conditions, treating with a bleaching earth, saponifying the stock to form soap, and bleaching the soap. No. 2,483,414. Lever Brothers Co.

**In making substituted ammonium thiocyanates** by reaction of a basic amino compound and ammonium thiocyanate, the improvement which comprises acting upon a basic amino compound with ammonium thiocyanate in a menstruum consisting essentially of liquid ammonia and isolating the substituted ammonium thiocyanate. No. 2,483,415. Koppers Co., Inc.

**Preparing beta (heterocyclicthio) carboxylic acid compounds** by dissolving a nitrogen-containing heterocyclic mercaptan in which the nitrogen is present in the heterocyclic ring in an alkaline aqueous solution and reacting the solution with a water soluble saturated aliphatic beta-lactone. No. 2,483,416. B. F. Goodrich Co.

**Purifying isoquinoline** to obtain an isoquinoline having a melting point above 20° C. comprising: cooling a dried crude isoquinoline to solidify isoquinoline therein and to form a semi-fluid mass, subjecting the semi-fluid mass to centrifugal action to extract mother liquor therefrom, melting and refreezing the purified isoquinoline to crystallize the isoquinoline and form a semi-fluid mass, and centrifugally extracting mother liquor from the partially purified mass. No. 2,483,420. Koppers Co., Inc.

**Disubstituted amino-alkyl benzhydryl amines.** No. 2,483,434. Parke, Davis & Co.

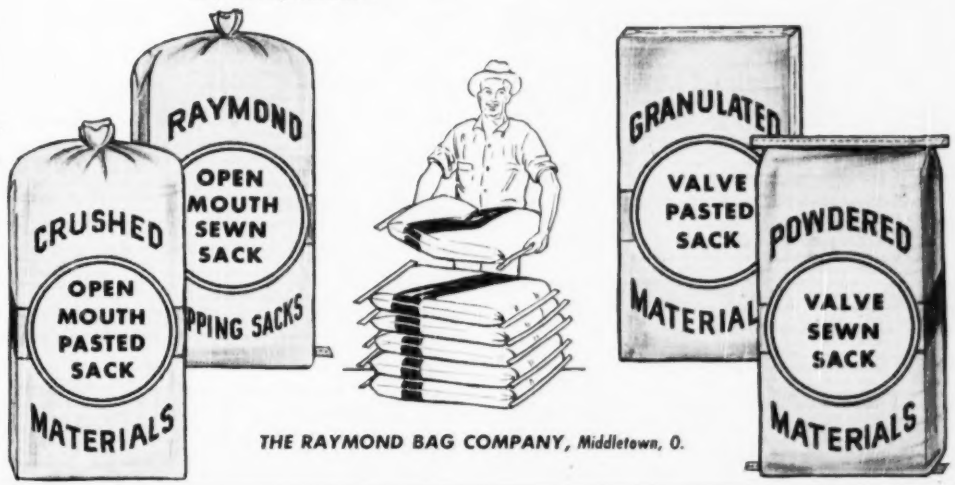
**Beta-benzohydryloxyethylamines.** No. 2,483,435. Parke, Davis & Co.

**Thioethers.** No. 2,483,436. Parke, Davis & Co.

**4-Amino-3-mercaptobenzenesulfonamide.** No. 2,483,447. E. I. du Pont de Nemours & Co.


## Here's a line-up of the finest MULTI-WALL PAPER SHIPPING SACKS used for packing Chemicals

**Illustrated are the four leading types of Raymond Multi-Wall Paper Shipping Sacks used by producers, packers, and shippers of crushed, powdered and granulated chemicals. They are made in practically any desired strength, printed in one or more colors or delivered plain. Raymond Shipping Sacks are CUSTOM BUILT to your requirements.**




*THE RAYMOND BAG COMPANY, Middletown, O.*

**Removing olefins from monocyclic aromatic hydrocarbons** by liquid-liquid extracting an olefin-containing monocyclic aromatic hydrocarbon with a liquid aluminum chloride-hydrocarbon complex to effect the removal of all of the olefin. No. 2,483,492. Phillips Petroleum Co.

**Double salts of phenol sulfonic acids.** No. 2,483,501. Standard Oil Development Co.

**2-benzyl-4-alkoxymethylene-5(4)-oxazolone hydrohalide.** No. 2,483,529. Merck & Co., Inc.

**β-ethoxy-α-phenylacetamidoacrylic acid.** No. 2,483,530. Merck & Co., Inc.

**Preparing vanillic acid** by subjecting a lignin substance to the oxidizing action of silver oxide in the presence of an aqueous solution of sodium hydroxide, acidifying, extracting with a water-immiscible vanillic acid solvent and recovering the vanillic acid. No. 2,483,559. Sulphite Products Corp.

**Producing an aromatic ketonic compound** by reacting an acylating agent and an acylatable aromatic compound selected from the group consisting of aromatic hydrocarbons, phenols, aryl halides, aryl ethers and anilides, in the presence of a non-carboxylic alkane sulfonic acid. No. 2,483,566. Universal Oil Products Co.

**Reacting phosphorus sesquisulfide** with an organic material selected from the group consisting of unsaturated esters of fatty acids, salts of unsaturated fatty acids, olefinic hydrocarbons, unsaturated fatty acids, and alcohols, the members of said group each containing at least about 8 carbon atoms, comprising, heating, and aerating the heated mixture with gas containing free oxygen. No. 2,483,571. Pure Oil Co.

**Maleic acid liquor purification** and isomerization to fumaric acid. No. 2,483,576. Allied Chemical & Dye Corp.

**Two-stage azeotropic distillation of nonaromatic hydrocarbons from toluene** in the presence of methyl alcohol. No. 2,483,625. Union Oil Co. of Calif.

**Aminoalkyl benzhydryl thioethers.** No. 2,483,671. Parke, Davis & Co.

**Alkyl-N-(ortho-bicyclohexyl)-carbamates.** No. 2,483,693. Monsanto Chemical Co.

**Preparation of a phosphorus- and sulfur-containing reaction product** by sulfurizing an intermediate phosphorus-and sulfur-containing reaction product with elementary sulfur, said intermediate reaction product being obtained by reacting phosphorus pentasulfide with an unsaturated acyclic ketone containing no substituents other than hydrogen. No. 2,483,736. Socony-Vacuum Oil Co., Inc.

**Etherifying a polyhydric alcohol** produced by the alkaline condensation of formaldehyde with a compound containing an activating group selected from the group consisting of carbonyl groups and nitro groups, said compound having active hydrogen atoms adjacent the activating group which comprises treating the crude condensation reaction mixture containing the polyhydric alcohol with a halide etherifying agent in the presence of the alkaline catalyst. No. 2,483,739. General Mills, Inc.

**Quaternary ammonium salt of a polymerized epihalohydrin.** No. 2,483,749. General Mills, Inc.

**Making a 1,4-diene adduct,** comprising reacting a conjugated dienic high molecular weight alcohol having the carbon skeleton of a soybean oil fatty acid with ethyl crotonate. No. 2,483,791. U.S.A. represented by the Secretary of Agriculture.

**Tall oil acid composition** containing the aliphatic amine soaps of tall oil acids and free tall oil acids, and free from uncombined amine. No. 2,483,797. Edward A. Van Valkenburgh.

**A dimethyl-3,4,4a,5,8,8a-hexahydro-2,1-benzopyran-8a-carboxaldehyde.** No. 2,483,824. Shell Development Co.

**3-diisobutyl-phenazine.** No. 2,483,838. Joseph B. Niederl.

**Preparing acrolein diacetate** by reacting acrolein with acetic anhydride in the presence of an acidic catalyst selected from the group consisting of sulfuric acid, phosphoric acid, and para-toluenesulfonic acid. No. 2,483,852. Shell Development Co.

**Ester of a lower aliphatic monocarboxylic acid with 2-hydroxy-1,5-pentanedinitrile.** No. 2,483,853. Shell Development Co.

**Improvement in the extraction of an olefin** from a mixture of hydrocarbons containing said olefin, which comprises contacting ammoniacal cuprous acetate solution with said hydrocarbon mixture. No. 2,483,863. Standard Oil Development Co.

**Production of ketene** by vapor phase pyrolysis of acetic acid in the presence of a catalyst consisting of a lower ester of phosphoric acid in association with a member of the group consisting of a lower ester of nitric acid and a nitro-hydrocarbon. No. 2,483,883. Societe "Rhodiaceta."

**Making nitrophenyl acylamido alkane diols.** No. 2,483,884. Parke, Davis & Co.

**[dl]-ψ-1-p-nitrophenyl-2-dichloroacetamidopropane-1,3-diol.** No. 2,483,885.

**Reacting 1,3-butadiene** with furfural to form a liquid addition product in the presence of a solid contact-type condensation catalyst. No. 2,483,903. Philips Petroleum Co.

**Preparing organosiloxanes** from organochlorosilanes of the type $RnSiCl_{4-n}$ where R is an alkyl or a monocyclic aryl radical and n has a value of at least 1.7 by introducing said silane in liquid phase at the upper end of a gas and liquid contact zone, and introducing water vapor at the lower end, introducing the silane in sufficiently large proportion relative to the water vapor that the hydrogen chloride which issues from the upper end of said zone is anhydrous, and introducing the water vapor in sufficiently large proportion relative to the silane to react with and effect hydrolysis of said silane with condensation of hydrolysis product thereof to siloxane. No. 2,483,963. Dow Corning Corp.

**Acyl polyalkylene-polyamine biguanides.** No. 2,483,969. General Aniline & Film Corp.

**N-(pyrrolidylalkyl)-phenothiazines.** No. 2,483,998. Upjohn Co.

**N-(beta-pyrrolidinoethyl)-phenothiazine.** No. 2,483,999. Upjohn Co.

**Phthalazines** in which a ring carbon atom in the ortho-position to a ring nitrogen of the pyridazine ring is directly connected with one of the two nitrogen atoms of a substituent selected from the group consisting of the hydrazino-group, hydrazino-groups substituted by hydrocarbon radicals and hydrazone radicals. No. 2,484,029. Ciba Pharmaceutical Products, Inc.

**Producing carotene concentrate** from palm oil by adding to palm oil in liquid condition, one acid of the group consisting of sulfuric acid, perchloric acid, fluorosulfonic acid, monofluorophosphoric acid, and difluorophosphoric acid, causing separation of a carotene-rich phase, separating the main body of the oil phase from the main body of the carotene-rich phase promptly inactivating the acid in the carotene-rich phase and thereby liberating an oily phase rich in carotene, and separating said oily phase. No. 2,484,040. Procter & Gamble Co.

**Halogenation of an aliphatic conjugated diolefin** to a corresponding dihalo monoolefin by reacting the diolefin in the vapor phase with an undiluted halogen of the group consisting of chlorine and bromine and quickly passing the reaction mixture into water to separate the dihalo mono-olefin from the unreacted halogen in the form of relatively dense water-immiscible oily globules, to inhibit interaction between the halogen and the dihalo monoolefin and to minimize the formation of saturated polyhalogen compounds. No. 2,484,042. Publicker Industries Inc.

**In manufacture of 2,2-bis-(4-methoxphenyl)-1,1,1-trichloroethane** by condensing anisole and chloral, the step comprising mixing anisole, chloral, and anhydrous aluminum chloride to form a homogeneous liquid reaction medium in which the aluminum chloride is dissolved. No. 2,484,056. E. I. du Pont de Nemours & Co.

**In manufacture of di-(alkoxyphenyl) haloethane** by condensing alkyl phenyl ether, the alkyl radical of which contains less than 13 carbon atoms, with a trihaloacetaldehyde, the step comprising mixing the ether, the aldehyde, and an anhydrous condensing agent selected from the group comprising aluminum chloride, aluminum bromide, aluminum iodide, boron trifluoride, and hydrogen fluoride, to form a homogeneous liquid reaction medium in which the condensing agent is dissolved. No. 2,484,057. E. I. du Pont de Nemours & Co.

**Dichloro methyl sulfenyl chloride.** No. 2,484,061. Cities Service Oil Co.

**In producing an unsaturated carboxylic acid,** reacting ketene and an α, β-olefinic aldehyde in the presence of an acidic condensing agent, producing an intermediate product that is convertible to an unsaturated carboxylic acid by reacting it with a strong mineral acid. No. 2,484,067. Carbide and Carbon Chemicals Corp.

**Preparing a mixture of hydrogen and carbon monoxide** by the partial combustion of reactants comprising an oxygen-containing gas and a hydrocarbon. No. 2,484,249. Texaco Development Corp.

**Oleaginous organic material** selected from the group consisting of a hydrocarbon oil and a fatty oil, which is normally susceptible to oxidative deterioration in the presence of a metal and compounds thereof which catalyze said oxidative deterioration, containing an organic dithioxamide. No. 2,484,257. Standard Oil Co.

**Condensing thiophene** with an alcohol containing an olefinic linkage between two carbon atoms of aliphatic character, one of which is linked directly by a single bond to the carbinol carbon atom, comprising contacting said reactants in the presence of sulfuric acid. No. 2,484,268. Socony-Vacuum Oil Co., Inc.

**N-substituted α-etherified acetamides** having the general formula $R\text{-}O\text{-}CH_2CO\text{-}NHR'$ wherein R is aralkyl and R' is an aliphatic hydrocarbon radical. No. 2,484,295. Lowell B. Kilgore and Helen Ford Kilgore.

**Separating a hydrocarbon mixture** containing aliphatic unsaturated hydrocarbon having at least one and not more than two double bonds per molecule and more saturated aliphatic hydrocarbon into more saturated hydrocarbon and more unsaturated hydrocarbon by contacting said mixture with a liquid selective solvent selected from the group consisting of paraldehyde and tetraethylorthosilicate. No. 2,484,305. Phillips Petroleum Co.

**Modifying castor oil** by partially dehydroxylating the oil by heating in the presence of a lead compound soluble in castor oil to reduce the acetyl value and raise the iodine value whereby the resultant oil is nondrying and miscible in mineral oil. No. 2,484,328. Spencer-Kellogg & Sons, Inc.

**Stabilizing a dialkyl haloacetal** by mixing a small proportion of triethanolamine therewith. No. 2,484,330. General Aniline & Film Corp.

**Preparing silicic acid esters** by reaction of an alkanol with a silicon halide. No. 2,484,394. Hartford National Bank and Trust Co.

**Nitrite salts of six-membered heterocyclic amines** containing within their cyclic structure an oxygen atom, an amino nitrogen atom, and four saturated carbon atoms, the oxygen atom and the amino nitrogen atom being in the 1,4 position relative to each other, and at least one carbon atom being substituted with an alkyl group. No. 2,484,395. Shell Development Co.

**Treating a mixture containing an alkaryl compound** having a side chain halogen atom and an aromatic compound free of side chain halogen atoms but having an unsaturated side chain to reduce the content of the alkaryl compound, which comprises contacting the mixture in the presence of a low molecular weight water-soluble alcohol with a solvent from the group consisting of furfural and alkyl derivatives of furfural, and through the agency of water causing stratification. No. 2,484,469. Mathieson Chemical Corp.

**Preparing aliphatic saturated carboxylic acids** from the beta lactones of the acids to be prepared which comprises hydrogenating in a closed vessel, in the presence of a metallic hydrogenation catalyst. No. 2,484,486. Eastman Kodak Co.

**Preparing glycol monoesters** by reacting an acid selected from the group consisting of acrylic and α-methacrylic acids with an alkylene oxide selected from the group consisting of ethylene and propylene oxides, in the presence of a tertiary amine catalyst. No. 2,484,487. Eastman Kodak Co.

**3,4-$C_{12}C_6H_3SO_2CBr_3$.** No. 2,484,489. Rohm & Haas Co.

**Preparing substituted aliphatic carboxylic acids** by hydrogenating in the presence of a Raney nickel hydrogenation catalyst β-lactones. No. 2,484,497. Eastman Kodak Co.

**Preparing butyric acid** by hydrogenating diketene in the presence of a Raney nickel hydrogenation catalyst and an inert organic liquid diluent. No. 2,484,498. Eastman Kodak Co.

**Preparing an ester-lactone** by hydrogenating in the presence of a hydrogenating catalyst the β-lactone of β-(2-furyl)-β-hydroxy propionic acid. No. 2,484,499. Eastman Kodak Co.

**Preparation of propionic acids** by reduction of beta propiono lactones. No. 2,484,500. Eastman Kodak Co.

**Alkanedistannonic acid** having a straight chain consisting of at least 3 and not more than 10 carbon atoms, the two stannonic acid groups being attached to the respective terminal carbon atoms of said straight chain and the remaining valences of the intermediate carbon atoms of said straight chain being attached solely to hydrogen atoms. No. 2,484,508. E. I. du Pont de Nemours & Co.

**Calciferol chaulmoograte.** No. 2,484,526. Usines Chimiques des Laboratoires Francais.

**2,4,6-tris-(fluoromethyl) triazine.** No. 2,484,528. E. I. du Pont de Nemours & Co.

**Polymerization product of 3,3,3-trifluoropropene** and a polymerizable aliphatic hydrocarbon which contains from 2 to 4 carbon atoms. No. 2,484,530. E. I. du Pont de Nemours & Co.

**2-sulfanilamido-pyrimidines** having an acetal substituent in the pyrimidine nucleus. No. 2,484,606. E. R. Squibb & Sons.

**Addition products of carbon bisulfide** and amino-methylene-naphthols. No. 2,484,621. C. Wingfoot Corp.

**2-sulfanilamido-4-alkoxymethyl-6-methyl-pyrimidines.** No. 2,484,629. E. R. Squibb & Sons.

**Rearrangement of isobutylene-nitrosyl chloride adduct** to form hydrazine dihydrochloride and organic reaction products which comprises maintaining the adduct in contact with hydrogen chloride in an organic reaction medium until adduct has been transformed to the liquid state and maintaining the resulting liquid in contact with a monohydric alcohol containing not more than 5 carbon atoms until hydrazine dihydrochloride and organic reaction products have been formed. No. 2,484,633. Allied Chemical & Dye Corp.

**N-[4-({2,4-dihydroxy-7-methyl-6-pteridyl}methyl amino) benzoyl]**

**glutamic acid** and alkali metal salts thereof. No. 2,484,634. National Drug Co.

**Cyanobutenyl acetoacetic esters.** No. 2,484,683. Rohm & Haas Co.

**Preparing an aliphatic alcohol** by contacting the corresponding olefin with a solution consisting of hydrogen fluoride and water. No. 2,484,702. Phillips Petroleum Co.

**Converting a dichlorothiophene** by nuclear acylation thereof into an acyl monochlorothiophene comprising reacting said dichlorothiophene with an acylating agent in the presence of phosphoric acid. No. 2,484,706. Socony-Vacuum Oil Co., Inc.

**1:4-dihydrazino-phthalazine and its acid salts.** No. 2,484,785. Ciba Pharmaceutical Products, Inc.

**Solvent extracting oil** from cottonseed meats comprising subjecting cottonseed meats to the action of a single phase liquid solvent mixture essentially comprising methanol and an aliphatic hydrocarbon. No. 2,484,831. Procter & Gamble Co.

**6-alkoxy-i-androstene-17-ols.** No. 2,484,833. Glidden Co.

**Recovering benzene** from impure benzene comprising mixing with a solvent in which the benzene and the impurities in the benzene are readily dissolved and which does not form an azeotrope with benzene, chilling to crystallize a major portion of the benzene while thoroughly stirring the mixture to produce fine grained crystals, separating the crystallized benzene, melting and distilling the benzene to recover a purified benzene, adding a benzene azeotrope solvent to the mother liquor, distilling the mixture to separate a benzene azeotrope from impurities and treating the benzene azeotrope to separate a purified benzene therefrom. No. 2,484,834. Koppers Co. Inc.

**Preparing an alcohol** which comprises reducing an organic hydroperoxide with at least one material of the group consisting of alkali metal sulfides and alkaline earth metal sulfides. No. 2,484,841. Hercules Powder Co.

**Anthraquinone-2-carboxylic dimethyl amide** having an $NH_2$ group in the 1-position and in the 4-position a group NHR where R is selected from aryl groups containing but a single ring and hydro-aryl groups containing but a single ring. No. 2,484,902. Celanese Corp. of America.

**Treating non-hydroxylated mixed glycerine non-drying oils** to change the chemical composition by adding boric acid, heating to liberate free fatty acids from the oil, distilling and freeing the residue from combined boric acid. No. 2,484,979. E. F. Drew & Co., Inc.

**Producing an aromatic dihaloalkane** by reacting an aromatic compound having a replaceable nuclear hydrogen atom and a dihaloolefin containing a middle halogen and in which the double bond is located at a tertiary carbon atom in the presence of a complex of a Friedel-Crafts halide. No. 2,485,017. Universal Oil Products Co.

**Vinylating acetic acid** with acetylene with a catalyst consisting of a carrier made by devolatilizing bituminous coal having from 4% to 6% of ash, and then activating said devolatilized coal by means of steam until the ash content of said carrier is in the range of 20% to 25% ash, said particles having zinc acetate present upon their surface. No. 2,485,044. Monsanto Chemical Co.

**Dehydrating aqueous formic acid** having an acid content not less than 77%, which comprises continuously introducing aqueous formic acid to be dehydrated into a cycle for formic acid including, spaced apart therein and placed in intercommunication thereby, an azeotropic distillation column and a simple distillation column, the azeotropic distillation column containing a predetermined amount of a water entrainer which is adapted to form an azeotrope with water but no azeotrope with formic acid. No. 2,485,048. Les Usines De Melle (Societe Anonyme).

**Producing 1,1,1-trichloro-3-bromo-2,3-dicarbalkoxy propanes and 1,1,1-trichloro-5-bromo-2,3,4,5-tetracarbalkoxy pentanes** by maintaining trichlorobromomethane and a dialkyl ester of one of the ethylene alpha, beta-dicarboxylic acids maleic and fumaric in contact with a peroxidic polymerization catalyst. No. 2,485,099. U. S. Rubber Co.

**Lactonization** of 2,4-polyhalogenoalkanoic esters. No. 2,485,100. U. S. Rubber Co.

**Synthesis of methionine** by hydrolyzing ethyl N-(1-cyano-3-methylthiolpropyl) carbonate by refluxing in an aqueous medium consisting of hydrochloric acid, formic acid and water. No. 2,485,116. Ayerst, McKenna & Harrison Ltd.

**Producing α-methyl benzyl esters of lower aliphatic acids** by heating styrene in admixture with an excess of a lower monocarboxylic aliphatic acid in the presence of nitric acid and a polymerization inhibitor for said styrene. No. 2,485,125. General Aniline & Film Corp.

**In the production of 2-methyl-4-chlorophenoxyacetic acid,** the steps comprising heating monochloroacetic acid under reflux with a crude chlorinated cresol. No. 2,485,140. Imperial Chemical Industries Ltd.

**Tetrahydrofurfuryl ester of nicotinic acid.** No. 2,485,152. Ciba Pharmaceutical Products, Inc.

**Production of epoxidized esters** of an unsubstituted alcohol which is free of non-benzenoid unsaturation and at least one of the acids from the group consisting of oleic and linoleic acids, which comprises reacting and epoxidizing said ester with a mixture of hydrogen peroxide and formic acid. No. 2,485,160. Rohm & Haas Co.

**7-chloro-4-(1-ethyl-4-piperidylamino) quinoline.** No. 2,485,162. U.S.A. as represented by the Secretary of War.

**Basic side chain substituted quinoline derivative.** No. 2,485,174. U.S.A. as represented by the Secretary of War.

**Dissolving a cyclic olefin in liquid sulfur dioxide,** passing nitrosyl chloride therethrough, and separating the resulting nitrosochloride. No. 2,485,180. Food Machinery and Chemical Corp.

**Dissolving an olefin having at least 6 carbon atoms** in a nitroparaffin having from 1 to 8 carbon atoms, passing nitrosyl chloride therethrough and separating the resulting nitrosochloride. No. 2,485,185. Food Machinery and Chemical Corp.

**2-[phenthiazinyl-(N)-methyl]-imidazolines, the corresponding 2-(phenoxazinyl) imidazolines, and their salts.** No. 2,485,212. Ciba Pharmaceutical Products, Inc.

**Preparation of 1,6-dicvano-2,4-hexadiene** by reacting a glycol of the formula $CH_2{=}CHCHOHCHOHCH{=}CH_2$ with hydrogen cyanide in an aqueous acidic solution containing a dissolved cuprous salt as catalyst, whereby a dinitrile of the formula $CNCH_2CH{=}CHCH{=}CHCH_2CN$ is produced, and thereafter separating the said dinitrile from the resulting mixture. No. 2,485,225. E. I. du Pont de Nemours & Co.

**Preparation of alpha-amino-gamma-methylthiol-butyronitrile,** an intermediate which may be hydrolyzed to form methionine, which comprises bringing alpha-hydroxy-gamma-methylthiol-butyronitrile into intimate contact with ammonia. No. 2,485,236. E. I. du Pont de Nemours & Co.

**Synthesis of aromatic aldehydes** by subjecting a mixture of aromatic hydrocarbon and carbon monoxide to the action of a mixed anhydrous hydrogen fluoride-boron trifluoride catalyst. No. 2,485,237. E. I. du Pont de Nemours & Co.

**Preparation of higher molecular quaternary pyridinium chlorides** and homologues thereof by mixing an alkyl chloride having at least 8 carbon atoms and a heterocyclic tertiary amine, in an autoclave containing at least 20% water and heating. No. 2,485,256. American Enka Corp.

**Separation of the isomers of triisobutylene** having a double bond attached to the second carbon atom in the longest chain from the isomers of triisobutylene having a double bond attached to the fourth carbon atom in the longest chain by adding hydrogen chloride whereby the hydrogen chloride reacts with the isomers having a double bond attached to the second carbon atom in the longest chain, distilling to separate the unreacted isomers of triisobutylene containing the double bond attached to the fourth carbon atom in the longest chain, dehydrochlorinating the triisobutylene chlorides and regenerating the triisobutylene isomers containing the double bond attached to the second carbon atom in the longest chain. No. 2,485,265. Standard Oil Development Co.

**Preparing a bis-(2-carboxyalkyl) sulfone** by bringing together a saturated aliphatic beta-lactone with a solution of a water-soluble hyposulfite in a polar solvent. No. 2,485,271. B. F. Goodrich Co.

**In the purification of a crude volatile ether** containing aldehyde, water and alcohol, the steps which comprise distilling from the crude ether under superatmospheric pressure an ether-rich distillate containing water and aldehyde, mixing with an aqueous alkali solution, separating an aldehyde-free ether-rich phase, and refluxing. No. 2,485,329. Standard Oil Development Co.

**Oxidizing naphthalene** by passing a mixture, comprising naphthalene vapor in air and water over an oxidation catalyst comprising a wire screen coated with vanadium oxide. No. 2,485,342. Standard Oil Development Co.

**Effecting reaction between a monohydric phenol free of substituent groups reactive toward chlorosilanes** and a constant boiling mixture of trimethylchlorosilane and tetrachlorosilane, and separating the aroxy silanes so formed. No. 2,485,366. General Electric Co.

**Chlorinated hydrocarbon.** No. 2,485,507. U.S.A. as represented by the U.S. Atomic Energy Commission.

**Preparing an ester of acrylic acid** by heating an ester of dihydracrylic acid to dehydration temperature in the presence of a neutral dehydration catalyst in the vapor phase. No. 2,485,510. American Cyanamid Co.

**Dehydrochlorination of a mixture comprising alpha and beta chlorethyl polychlorobenzenes** by mixing the alpha and beta chlorethyl polychlorbenzene mixture with a heated inert gas over calcium sulfate. No. 2,485,524. Monsanto Chemical Co.

## *Paper and Pulp*

**In making felts for paper making machines,** the steps of impregnating with an emulsion of butadiene acrylonitrile copolymer and curing. No. 2,482,236. Orr Felt & Blanket Co.

**Impregnating paper making felts** with polyvinyl alcohol containing emulsion and curing. No. 2,482,237. Orr Felt & Blanket Co.

## *Petroleum*

**Conversion of liquid hydrocarbon** in the presence of a substantially compact column of moving particle-form solid contact material moving through an upright conversion zone. No. 2,482,137. Lummus Co.

**Conversion of a charge of high boiling liquid hydrocarbons** which comprises passing a compact column of particle form contact material vertically downward through an elongated conversion zone. No. 2,482,139. Lummus Co.

**In conversion of a charge of high boiling liquid hydrocarbons** in the presence of a substantially compact column of moving particle form solid contact mass material moving through an elongated conversion zone, the method for introduction of contact material and liquid hydrocarbon charge into said conversion zone. No. 2,482,140. Lummus Co.

**Producing hydrogen-carbon monoxide gas mixtures** for the synthesis of hydrocarbons in the presence of a synthesis catalyst which method comprises introducing finely divided carbonaceous solids into a combustion zone, heating a fluent mass of said finely divided carbonaceous solids to incandescence by passing a gas comprising oxygen upwardly therethrough to maintain the solids as a suspended dense turbulent phase superimposed by a light dispersed solids phase in said combustion zone, separating solids from gaseous combustion products, removing incandescent solids comprising carbon in dense phase fluidized condition and introducing said removed solids into a decomposing zone, passing a conversion gas consisting essentially of oxygen, steam, and methane upwardly in the decomposing zone at a rate sufficient to maintain a suspended dense turbulent solids phase therein superimposed by a dilute solids phase, maintaining said decomposing zone at a temperature upwards of 1500° F. No. 2,482,187. Standard Oil Co.

**Converting gaseous hydrocarbons** into useful products by partially oxidizing the gaseous hydrocarbons to produce oxygenated compounds, residual gaseous hydrocarbons, and carbon monoxide, recovering oxygenated compounds from the product stream, reacting the residual gaseous hydrocarbons with an oxidizing gas to produce hydrogen and carbon monoxide, contacting the hydrogen and carbon monoxide mixture with a hydrocarbon synthesis catalyst to produce higher molecular weight hydrocarbons and oxygenated compounds, and recovering a normally gaseous hydrocarbon fraction, a liquid hydrocarbon fraction, and a water fraction including oxygenated compounds. No. 2,482,284. Standard Oil and Gas Co.

**Lubricating composition** comprising a liquid hydrocarbon and a stable, non-corrosive phosphorus and sulfur-containing reaction product obtained by reacting phosphorus sulfide and a cyclic ketone fraction having at least 12 carbon atoms. No. 2,482,762. Shell Development Co.

**Composition of matter** adapted for addition to lubricating oil consisting of an oil-soluble metal salt of the reaction product of a phosphorus compound of the class consisting of phosphorus sulfides and phosphorus oxides with a petroleum sulfonic acid. No. 2,483,270. Union Oil Co. of Calif.

**Flotation separation of porous cracking catalyst particles** of substantially identical chemical composition but varying activity which comprises filling the pores of said particles with a liquid hydrocarbon, admixing said hydrocarbon filled particles with an aqueous liquid having a specific gravity numerically intermediate the maximum and minimum values for particle densities of said hydrocarbon filled particles and separately removing the portion of said particles which floats. No. 2,483,372. Socony-Vacuum Oil Co., Inc.

**In desorbing a volatile metal halide of the Friedel-Crafts type** from a solid adsorbent material which comprises passing in contact with such a material having such a metal halide adsorbed thereon a substantially anhydrous vaporous stream of a gas which is substantially non-reactive with the metal halide in admixture with a hydrogen halide the halogen

of which corresponds to the halogen of said metal halide, the improvement which comprises increasing the hydrogen halide partial pressure during said passage to provide a hydrogen partial pressure higher in the later than in the earlier periods of the halide desorption operation. No. 2,483,487. Phillips Petroleum Co.

**A lube oil additive,** an oil soluble product having a molecular weight range from 500 to 5,000 comprising polymeric sulfone condensation products of a paraffin wax sulphonyl halide and a polynuclear aromatic hydrocarbon, said product being obtained by a Friedel-Crafts condensation. No. 2,483,499. Standard Oil Development Co.

**Compounded lubricant** comprising a mineral lubricating oil base and a product obtained by reacting elemental sulfur with a basic polyvalent metal salt of an alkylated phenol sulfide. No. 2,483,505. Standard Oil Development Co.

**Hydrocarbon synthesis** from carbon monoxide and hydrogen catalyzed by oxidized and reduced iron. No. 2,483,512. Standard Oil Development Co.

**Preparation of high-viscosity extreme pressure base additive** comprising, reacting sulfur with a non-drying fatty oil containing a substantial amount of free fatty acid, while maintaining said non-drying fatty oil in intimate contact with finely dispersed air, said finely dispersed air being injected rapidly into the reaction mixture by passing air through a solid porous body immersed in the mixture of said oil and sulfur until a good copper corrosion strip test is obtained and then phosphorizing the sulfurized product with phosphorous sesquisulfide. No. 2,483,600. Pure Oil Co.

**Contacting a mixture of CO and $H_2$** with a dense, turbulent mass of finely divided alkali metal salt promoted iron synthesis catalyst fluidized by an upwardly flowing gas in a reaction zone, withdrawing partially oxidized iron catalyst of smaller than fluidizable size from said reaction zone, introducing said withdrawn catalyst into a second reaction zone, maintaining said catalyst in said zone as a suspension in a liquid, feeding to said suspension in said second reaction zone a mixture of CO and $H_2$ in synthesis proportions and recovering valuable conversion products from both zones. No. 2,483,771. Standard Oil Development Co.

**Handling olefinic hydrocarbons** normally tending to form insoluble self-propagating polymers which eventually plug the handling equipment comprising handling said olefinic hydrocarbons until a small amount of said self-propagating polymer is formed, removing the olefinic hydrocarbons from the polymer, treating the said polymer with an agent capable of reacting therewith at said reaction conditions by addition to an olefinic linkage whereby further growth of said polymer is inhibited and then recontacting the olefinic hydrocarbon with the treated growth inhibited polymer. No. 2,483,778. Standard Oil Development Co.

**Grease composition** comprising mineral base lubricating oil and the complex reaction product of an oil-soluble salt of a sulfonic acid and a water-soluble salt of an inorganic acid in which at least one cation in the above salts is polyvalent, said salt being free of chloride ions to thicken the mineral oil to a grease consistency. No. 2,483,800. Standard Oil Development Co.

**Reclaiming an iron catalyst** contaminated with carbonaceous material by burning said contaminant to remove carbonaceous contaminant to the extent that the thus treated catalyst does not contain more than about 30 nor less than about 5 weight percent carbonaceous material, cooling mixing with water to form a moist loosely compacted mass, exposing said mass to sintering temperatures, quenching, and regrinding the sintered products. No. 2,483,850. Standard Oil Development Co.

**Lubricating composition** comprising a mineral oil containing dispersed therein a polyvalent metal salt of a reaction product obtained by simultaneously polymerizing and alkylating in the presence of a Friedel-Crafts catalyst a hydroxy aromatic monocarboxylic acid and an olefin having at least four carbon atoms and thereafter reheating said reaction product in an inert liquid medium for about ½ hour. No. 2,483,859. Shell Development Co.

**Separating ethylene** from a mixture containing ethylene and methane and heavier hydrocarbons by a fractionation process. No. 2,483,869. Phillips Petroleum Co.

**Dehydrogenating an aliphatic hydrocarbon** having from 2 to 8 carbon atoms by subjecting the hydrocarbon to dehydrogenating conditions at an elevated temperature in the presence of a dehydrogenating catalyst comprising beryllium oxide, chromium oxide, and aluminum oxide. No. 2,483,929. Phillips Petroleum Co.

**Water base well drilling mud** comprising sufficient water to maintain the mud as a fluid, sufficient clayey material to form a filter cake on the wall of the well, and water soluble oxidized mannogalactan. No. 2,483,936. Phillips Petroleum Co.

**Single phase lubricating composition** consisting of a lubricant selected from the group consisting of mineral oil, a mixture of mineral oil and saponifiable oil based on the mineral oil and a mixture of mineral oil and a metal soap jelling agent, and a phosphoric acid salt, of a condensation product of one mol of an amine, selected from the group consisting of polyalkyleneamines having from 3 to 5 amino groups, alkylol amines having from 2 to 3 hydroxyl groups and alkylolpolyamines having from 2 to 3 amino groups, the alkylene and alkylol units having 2 to 4 carbon atoms, with a higher fatty acid selected from the group consisting of the acids whose formulae are represented by $C_nH_{2n+1}COOH$ wherein n is at least 11, oleic, linoleic and riconoleic acids. No. 2,484,146. E. F. Houghton & Co.

**Cracking of hydrocarbon oil** by subjecting said oil at cracking conditions to contact with a catalyst prepared by commingling an acid with an alkali metal silicate and dispersing the mixture in the form of droplets into a suspending medium under conditions to form firm silica hydrogel spheres, compositing said spheres with a metal oxide, treating to remove alkali metals, heating and thereafter suspending in an aqueous solution of ammonium hydroxide. No. 2,484,258. Universal Oil Products Co.

**Synthetic lubricant** consisting of a liquid condensation polymer of a compound from the group consisting of bis (hydroxyalkyl) sulfides and bis (hydroxyalkyl) polysulfides. No. 2,484,369. Shell Development Co.

**Treating carbonyl sulfide contaminated hydrocarbon gases** to effect separation of the carbonyl sulfide by commingling said gases with added hydrogen, contacting with a hydroforming catalyst, and recovering from the effluent of the catalytic zone carbonyl sulfide-free hydrocarbon gases. No. 2,484,381. California Research Corp.

**Lubricant composition** and as an addition agent the reaction product of hydrogenated sperm oil hydrogenated to an iodine value of not over 40% with phosphorus pentasulfide. No. 2,484,843. Standard Oil Co.

**Inhibiting polymerization** of furfural in extractive distillation by a furfural polymerization inhibiting compound selected from the group consisting of pyridine and its alkyl homologues. No. 2,485,070. Phillips Petroleum Co.

**Inhibiting polymerization of furfural** in extractive distillation by a furfural polymerization inhibiting compound selected from the group consisting of alkali metal thiocyanates. No. 2,485,071. Phillips Petroleum Co.

**Catalytic treatment of fluid hydrocarbons** with oxides and sulfides of vanadium which are in substantial equilibrium at a temperature between 900° F. and 1200° F. with a mixture of hydrogen, hydrocarbon and a volatile sulfur containing compound. No. 2,485,073. California Research Corp.

**Composition** consisting of an oil-soluble petroleum sulfonate and an alkylphenoxy-ethoxyethoxyethanol having an alkyl group of 4 to 12 carbon atoms dissolved in a mineral oil. No. 2,485,150. Rohm & Haas Co.

**Converting hydrocarbon oils** by contact with a catalyst consisting of active magnesia and active silica by mixing finely divided magnesia with silica hydrogel and drying and igniting. No. 2,485,260. Standard Oil Development Co.

**In a catalytic hydrocarbon conversion process** employing an electrically conductive organic complex of an aluminum halide, hydrogen halide and a hydrocarbon in a ferrous metal reaction vessel corrodible by said complex, the step of passing a direct electrical current through said complex to the walls of the reaction vessel as a cathode. No. 2,485,276. Standard Oil Development Co.

**Emulsion** comprising a hydrocarbon boiling in the gasoline range and a mixture including a major amount of a saturated aqueous solution of a hydroxy benzoic acid and a minor amount of a ketone selected from the class consisting of acetone and methyl ethyl ketone. No. 2,485,297. Standard Oil Development Co.

**Separating a hydrocarbon** boiling in the gasoline boiling range from an aqueous hydrocarbon emulsion with an admixture of an aqueous solution of a hydroxy benzoic acid and a ketone selected from the class consisting of acetone and methyl ethyl ketone by adjusting the concentration of the ketone to form a hydrocarbon phase and an aqueous phase, and separating. No. 2,485,298. Standard Oil Development Co.

**Controlled severity fluid coking.** No. 2,485,315. Standard Oil Development Co.

## *Photographic*

**Phenoxyalkylamines** as accelerators for photographic developers. No. 2,482,546. General Aniline & Film Corp.

**Nitrocellulose subbing composition** for the subbing of a photographic film support prepared from a polymer selected from the class consisting of polyvinyl chloride, polyvinyl bromide, polyvinyl acetate, poly (vinyl chloride-vinyl acetate), and mixtures thereof which consist of a solution of: cellulose nitrate (11% nitrogen), acetone, methyl ethyl ketone, methanol, dioctyl phthalate, and ethanol. No. 2,483,966. General Aniline & Film Corp.

**In producing color photographic images** selected from the class consisting of indophenol and azomethine dyes in a color film having a plurality of silver halide emulsion layers by exposing the film, color developing the same, bleaching, fixing and washing, the improvement which comprises avoiding the formation of stain, after the bleaching, fixing, and washing operations, by rinsing the film with an aqueous solution consisting of water and boric acid. No. 2,483,971. General Aniline & Film Corp.

**Light-sensitive coating composition** comprising a mixture of a bichromated hydrophilic colloid, lead sulfite, and an aqueous colloidal dispersion of a water-insoluble soft polymerized material selected from the group consisting of natural and synthetic rubbers, polyvinylidene chloride, polystyrene, polyvinyl acetate and polyacrylates. No. 2,484,451. Eastman Kodak Co.

**Silver halide dispersion** essentially consisting of a suspension of silver halide prepared by a double decomposition reaction in an aqueous solution of polyvinyl pyridine. No. 2,484,456. Eastman Kodak Co.

**Making color couplers** by reacting sulfobenzoyldichloride in successive stages, with a 1-phenyl pyrazolome having a reactive methylene group in the 4-position and having a primary amino substituent, and with 5-amino-2-mercaptobenzimidazole. No. 2,484,477. Eastman Kodak Co.

**Intensifying a latent image of a photographic silver halide emulsion layer** by treating said emulsion layer, subsequent to exposure and prior to development, with an aqueous solution of an alkali metal perborate, and developing the latent image. No. 2,484,538. Eastman Kodak Co.

**Diazotype compositions** containing N-acylamino phenol couplers. No. 2,485,122. General Aniline & Film Corp.

## *Polymers*

**A laminated member** comprising a plurality of sheets of fibrous material and a binder impregnating the sheets and bonding them together, the binder composed of the copolymer of a monomer having the group $H_2C{=}C<$ and the reaction product of acidic compound selected from the group consisting of ethylene alpha-beta dicarboxylic acids and anhydrides thereof and castor oil and another vegetable oil. No. 2,482,086. Westinghouse Electric Corp.

**Preparing a thermoplastic organo polysiloxane** in which the organic radicals are selected from the group consisting of methyl and aryl radicals containing at least 0.1% by weight hydroxyl radicals, which method comprises maintaining the polysiloxane in solution in an inert solvent with an alkali metal hydroxide until a hydroxyl-free polysiloxane is obtained. No. 2,482,276. Dow Corning Corp.

**Polymeric N.N-trimethylene substituted aromatic sulfonamide** selected from the class consisting of benzene, p-chlorobenzene, p-bromobenzene, toluene and naphthalene sulfonamides, in which the trimethylene radical contains not more than two substituents, selected from the class consisting of methyl and ethyl, which are connected to different carbon atoms. No. 2,482,389. Libbey-Owens-Ford Glass Co.

**Resinous reaction product** of a phenol selected from the group consisting of hydroxybenzene, cresols, xylenols and cresylic acid, a primary monoarylamine, a secondary diaryl monoamine and an aldehyde selected from the class consisting of formaldehyde and its polymers. No. 2,482,498. Westinghouse Electric Corp.

**Laminates** embodying mixed phenol-arylamine-formaldehyde resinous products. No. 2,482,499. Westinghouse Electric Corp.

**Resinous heat reaction product** of an alkyl ether of methylol melamine with an alkyl ortho silicate. No. 2,482,508. Monsanto Chemical Co.

**Resin solution** comprising the polyesteramide resinous reaction product of an unsaturated acidic compound selected from the group consisting of maleic acid, maleic anhydride and fumaric acid, saturated aliphatic hydrocarbon dicarboxylic acids having an average of from 2 to 3½ non-carboxyl carbon atoms per acid molecule selected from the groups consisting of saturated hydrocarbon dicarboxylic aliphatic acids having from 1 to 12 non-carboxyl carbon atoms, the saturated dicarboxylic aliphatic acids composed of succinic acid, a saturated hydrocarbon primary diamine having an average of from 2 to 3 carbon atoms per molecule, and a saturated polyhydric paraffinic alcohol having no other reactive groups than the hydroxyl groups, the major proportion of the polyhydric alcohol being a glycol. No. 2,482,515. Westinghouse Electric Corp.

**Odorless phenol-formaldehyde resinous products.** No. 2,482,525. Westinghouse Electric Corp.

**Mineral aggregate bonding composition** comprising a bitumen and a condensation product of a diamine with a compound from the group con-

sisting of alkyl and alkenyl substituted succinic and succinamic acids, anhydrides, and acid esters thereof, to increase the adhesivity of the bitumen for mineral aggregates. No. 2,482,586. Atlantic Refining Co.

**Homopolymer** of a naphthenic acid ester of a beta, gamma-monoolefinic monohydric alcohol. No. 2,482,606. Shell Development Co.

**Ethers of polyalkylated cyclic sulfones.** No. 2,482,631. Shell Development Co.

**Heating aniline and dicyandiamide** in the presence of zinc chloride to liberate ammonia. No. 2,482,710. American Cyanamid Co.

**Copolymerizing vinylidene chloride and vinyl chloride.** No. 2,482,771. Dow Chemical Co.

**Liquid linear polysiloxane** comprising polymeric dimethylsiloxane containing monomethylsiloxane copolymerized therewith and diphenylsiloxane copolymerized therewith, the said linear polysiloxane chain being terminated by two silicon atoms to each of which are attached three hydrocarbon radicals selected from the class consisting of alkyl and aryl radicals. No. 2,483,158. General Electric Co.

**Copolymers of vinyl furane and chloroprene.** No. 2,483,182. Wingfoot Corp.

**Polymer and copolymer of allyl carbamate.** No. 2,483,194. Wingfoot Corp.

**Preparing a polysiloxane resin** by partially hydrolyzing a mixture of monovalent hydrocarbon-substituted chlorosilanes including methylchlorosilanes by adding to a solution of said chlorosilane mixture in a polyether solvent a quantity of water less than that calculated as necessary for complete hydrolysis of the chlorosilanes, heating to remove a major portion of the hydrogen chloride and thereafter adding sufficient water to complete the conversion of the chlorosilanes to polysiloxanes. No. 2,483,209. General Electric Co.

**Partially depolymerizing a polyvinyl isopropyl ether** which comprises milling the polymer with 2% of benzoyl peroxide and interrupting the process by milling into the polymer p-hydroxyphenyl morpholine. No. 2,483,374. General Aniline & Film Corp.

**Insulating coating composition** consisting of a cellulose ether, chlorinated diphenyl, dibutyl phthalate, paraffin wax, castor oil, triphenyl phosphate, and solvent, said cellulose ether being selected from the group consisting of benzyl cellulose and ethyl cellulose. No. 2,483,441. Insl-X Corp.

**Hard resin** obtained by heating phenol, formaldehyde and a normally liquid monohydric alcohol ester of a rosin acid, in the presence of an acid condensation catalyst. No. 2,483,468. Hercules Powder Co.

**Production of linear polyamides,** by reacting an ester of oxalic acid selected from the group consisting of methyl and ethyl esters with tetramine containing as its sole reactive groups two primary amino groups linked by the radical—$CH_2$—$CH_2$—, the process being carried out in a solvent for the monomers and a non-solvent for the polymer. No. 2,483,514. Celanese Corp. of America.

**A polyester of a polyhydric alcohol** in which the polyfunctional acyl group has the formula –OOC–CR–COO– in which R is an aliphatic hydrocarbon group containing from 6 to 16 carbon atoms. No. 2,483,726. General Mills, Inc.

**Copolymer** made from 2,5-dichlorostyrene and styrene. No. 2,483,753. Monsanto Chemical Co.

**Producing coating compositions** characterized by high flexibility and water resistance which comprises reacting urea and thiourea and phenol with an excess of formaldehyde in the presence of an alkaline catalyst, then acidifying and continuing the reaction. No. 2,483,854. Snyder Chemical Corp.

**Preparation of a dispersion of an alkali metal** in an inert liquid hydrocarbon dispersing medium by comminuting said alkali metal in said hydrocarbon in the presence of carbon black. No. 2,483,886. Phillips Petroleum Co.

**Polymerization of a conjugated diolefin** by admixing said diolefin with a liquid inert hydrocarbon dispersion containing a finely divided and dispersed alkali metal and a mercaptide of said alkali metal. No. 2,483,887. Phillips Petroleum Co.

**Vinyl chloride polymer compositions** containing maleic-vinyl acetate heteropolymers and compounds of lead, calcium, or barium. No. 2,483,959. Monsanto Chemical Co.

**Preparing granular polymeric products** by polymerizing in an aqueous dispersion a polymerizable material containing a vinyl halide from the group consisting of vinyl chloride and vinyl bromide, said dispersion also containing a water-insoluble reaction product of a basic compound of a metal from the group consisting of lead, barium and calcium and a maleic-vinyl acetate heteropolymer. No. 2,483,960. Monsanto Chemical Co.

**Heat polymerizable compositions of N-vinyl pyrrole compounds** stabilized with stearyl alcohol. No. 2,483,962. General Aniline & Film Corp.

**Reacting a compound of the type $XCH_2SiR_2Y$** in which X represents a halogen and Y represents a substituent of the group consisting of alkoxyl and halogen with an alkali metal whereby to produce polymers containing polymer units of the type $(CH_2SiR_2)$ in which R represents a radical of the group consisting of phenyl and alkyl. No. 2,483,972. Dow Corning Corp.

**Preparing an unsubstituted aliphatic polyene guanamine** by dissolving a biguanide in a solvent therefor, adding a lower alkyl ester of a polyolefinic aliphatic carboxylic acid, carrying the reaction to substantial equilibrium, and isolating the resultant aliphatic polyene guanamine. No. 2,483,986. American Cyanamid Co.

**Synthetic resin compositions** comprising liquid monostyrene and the acid half ester reaction product of castor oil and an anhydride of an olefinic alpha, beta dicarboxylic acid. No. 2,484,215. Westinghouse Electric Corp.

**Resinous material** comprising the reaction product derived by heating zinc isopropyl maleate with styrene. No. 2,484,216. Westinghouse Electric Corp.

**Heat-curable, resinous material** obtained by reacting at elevated temperatures under acid conditions a methylol melamine with 2-nitro-2-methyl-1-propanol. No. 2,484,315. Monsanto Chemical Co.

**Preparing a liquid mixture of linear copolymers** having improved oxidation stability which comprises heating an alkylene sulfide and an alkylene oxide with an alkali metal hydroxide catalyst. No. 2,484,370. Shell Development Co.

**Producing high molecular weight, propylene polymers** by catalyzing the polymerization of liquid-phase propylene by a solution of aluminum chloride in substantially olefin-free liquid butane. No. 2,484,384. California Research Corp.

**Manufacture of polyvinyl acetate phthalate** by reacting polyvinyl acetate having free and esterifiable hydroxyl groups with phthalic anhydrides and pyridine, adding trisodium phosphate to the mass in an amount sufficient to neutralize the free carboxyl groups of the ester formed and subsequently separating the ester from the mass by mixing with a precipitating liquid consisting of water and a mineral acid. No. 2,484,415. Eastman Kodak Co.

**Quaternizing a resinous polyvinylpyridine** comprising heating with a compound selected from the group consisting of dialkyl sulfates and alkyl arylsulfonates, in solution in a neutral organic compound selected from the group consisting of saturated monohydric aliphatic alcohols, saturated aliphatic ethers, saturated aliphatic ketones and 1,4-dioxane. No. 2,484,420. Eastman Kodak Co.

**Preparing a salt of basic polyvinylamine** in which at least 90% of the nitrogen atoms attached to carbon atoms in the polyvinyl chain are in the form of $-NH_2 \cdot HX$ groups, wherein X is an anion selected from the group consisting of a chloride ion, a bromide ion, an acetate ion, an alpha-chloropropionate ion and a bromobenzoate ion, comprising reacting a polyvinyl cyclic imide with hydrazine hydrate, treating the resinous product resulting therefrom with an acid. No. 2,484,423. Eastman Kodak Co.

**Quaternary salts** of polyvinyl pyridine and polyvinyl quinoline. No. 2,484,430. Eastman Kodak Co.

**Acid-curing aldehyde reaction product** capable of forming a water-insoluble resin under acidic conditions and as a latent curing catalyst therefor an essentially neutral nitroamide of a carboxy acid. No. 2,484,481. E. I. du Pont de Nemours & Co.

**Dispersion** in an anhydrous normally liquid organic medium of a copolymer of tetrafluoroethylene and another polymerizable monoethylenically unsaturated compound, said organic liquid medium being one which is selected from the group consisting of ketones and neutral esters of carboxylic acids. No. 2,484,483. E. I. du Pont de Nemours & Co.

**Adhesively joining the surfaces of two members,** one of which is solid tetrafluoroethylene polymer, by applying to a surface of at least one of said members a coating of an aqueous dispersion of colloidal polytetrafluoroethylene containing a surface-active agent and colloidally dispersed polytetrafluoroethylene, contacting the coated surface before drying of the coating with a surface of the other member, heating until dry, and then heating the laminated assembly. No. 2,484,484. E. I. du Pont de Nemours & Co.

**Resinous copolymer** containing an acetylated enolate, and another unsaturated copolymerizable compound selected from the group consisting of styrene; acrylonitrile; α-methacrylonitrile; and unsaturated esters. No. 2,484,501. Eastman Kodak Co.

**Replacing a hydroxyl group of a polyvinyl compound** containing polyvinyl alcohol hydroxyl groups by a halogen atom, by reacting with a member selected from the group consisting of anhydrous hydrogen chloride, anhydrous hydrogen bromide, and anhydrous hydrogen iodide in the presence of a nitrile having the formula: R–CN wherein R represents a member selected from the group consisting of a hydrogen atom and an alkyl group of the formula $C_nH_{2n+1}$ wherein n is a positive integer from 1 to 4. No. 2,484,502. Eastman Kodak Co.

**Decreasing the thermoplasticity and solubility of ethylene polymers** by blending a ketone with a solid polymer of ethylene, exposing said blend of polymer and ketone to a concentrated source of ultraviolet light until the blend becomes insoluble in organic solvents in which said polymer is soluble before being subjected to said process. No. 2,484,529. E. I. du Pont de Nemours & Co.

**In precipitating cyclized synthetic polyisoprene,** the steps of adding the cyclized polyisoprene solution containing a cyclizing agent to a quench liquid comprising a major proportion of water, gelatin, and recovering the precipitated polyisoprene. No. 2,484,614. Wingfoot Corp.

**Copolymer of vinylidene chloride,** isobutene and a polymerisable aliphatic monoethenic compound of the formula $CH_2{=}CR_1R_2$ where $R_1$ is selected from the group consisting of hydrogen, methyl and chlorine, and $R_2$ is selected from the group consisting of nitrile, lower alkyl carboxy ester, acetoxy and methyl keto radicals. No. 2,484,760. Distillers Co., Ltd.

**Preparing a powdery, water-soluble, amorphous melamine-formaldehyde reaction product** by reacting melamine with an aqueous solution of formaldehyde, dehydrating and recovering the powdery, amorphous product. No. 2,485,059. Monsanto Chemical Co.

**Colloidal aqueous solution of a resinous copolymer of melamine, urea and formaldehyde.** No. 2,485,079. American Cyanamid Co.

**Colloidal melamine-urea-formaldehyde copolymer solutions.** No. 2,485,080. American Cyanamid Co.

**Reacting an alkaline polysulfide** with a mixture containing 1,2,3 trichlor propane and allyl chloride. No. 2,485,107. Thiokol Corp.

**In the aqueous emulsion polymerization of vinyl acetate,** the steps comprising vinyl acetate, a ketone consisting of hydrocarbon and carbonyl groups taken from the group consisting of aliphatic ketones and aliphatic aromatic ketones containing not more than 10 carbon atoms. No. 2,485,141. E. I. du Pont de Nemours & Co.

**Manufacture of resinous products** by incorporating a cellulose filler with a methylol mono methylene diurea and N-trimethylol melamine, and thereafter thermally hardening the resulting mixture in the presence of an accelerator which liberates acid on hydrolysis. No. 2,485,187. E. I. du Pont de Nemours & Co.

**Urea-formaldehyde compositions.** No. 2,485,203. E. I. du Pont de Nemours & Co.

**Polymer** obtained by hydrolyzing the interpolymer of allylidene diacetate and vinyl acetate said polymer containing recurring aldehyde and hydroxy groups. No. 2,485,239. E. I. du Pont de Nemours & Co.

**Polymerizing a monomeric material comprising predominantly a chloroethylene** having from one to two chlorine atoms on one only of the carbon atoms, and having only hydrogen atoms attached to the remaining valences of the ethylenic carbon atoms, in aqueous emulsion in the presence of an aliphatic amino-substituted alcohol of the structure $NH_{3-n}R_n(OH)_n$ wherein R is an aliphatic hydrocarbon radical containing from 2 to 6 carbon atoms and n is an integer from 1 to 3. No. 2,485,270. B. F. Goodrich Co.

**Producing clear, bubble-free castings** by polymerizing monomeric vinylidene compounds in the presence of nitric oxide. No. 2,485,277. B. F. Goodrich Co.

**Plasticized resin composition** comprising a thermoplastic polymer of a vinyl halide and ester plasticizer. 2,485,281. B. F. Goodrich Co.

**Copolymers of tetrahydroabietyl alcohol-modified unsaturated alkyd resins** and vinyl compounds. No. 2,485,294. American Cyanamid Co.

**Phenol aldehyde-petroleum pitch-drying oil** impregnating composition. No. 2,485,327. Southern Friction Materials Co.

**Making an ion-exchange material** from light oil acid sludges. No. 2,485,352. Interlake Chemical Corp.

**In copolymerizing isobutylene with isoprene with a Friedel-Crafts catalyst,** the steps of forming a liquid reaction mixture by mixing the isobutylene and isoprene with nitrous oxide in liquid phase, cooling, admixing a solution of aluminum chloride in methyl chloride whereby the isobutylene and isoprene are copolymerized, and withdrawing a slurry containing non-agglomerating particles of the resulting solid polymer precipitated by said nitrous oxide. No. 2,485,454. Standard Oil Development Co.

**Forming sealing deposits in wells** by mixing two partially condensed phenolic-aldehydic resinous liquids just prior to introducing the mixture into the well. No. 2,485,527. Dow Chemical Co.

**Ceric sulfate** catalyzed emulsion polymerization of styrene. No. 2,485,535. Monsanto Chemical Co.

## *Rubber*

**Rubber-like material** obtained by polymerizing in an aqueous emulsion a

mixture of 1,3-butadiene, styrene, and dimethyl(ethenylethynyl) carbinol. No. 2,482,285. E. I. du Pont de Nemours & Co.

**Chloroprene polymers** having improved resistance to the deteriorating effects of heat and light, having incorporated therein, zinc oxide and an alkali metal salt of an aliphatic polyhydroxythiol which contains at least 5 and not over 6 carbon atoms. No. 2,482,293. E. I. du Pont de Nemours & Co.

**In driving off volatile materials from synthetic elastromer latices** prepared by emulsion polymerization of monomeric material comprised of at least 50% of a butadiene-1,3 compound in which foaming of the latex normally occurs, the step which comprises incorporating with the latex an aqueous emulsion of a water immiscible organic solvent solution of a stable polymeric dimethyl silicone. No. 2,482,307. E. I. du Pont de Nemours & Co.

**Vulcanized composition** resistant to heat deterioration comprising rubbery material covulcanized with sulfur based on the weight of rubbery material, said rubbery material consisting of natural rubber and a mixture consisting of rubbery polychloroprene with the remainder of said mixture being a rubbery copolymer of a butadiene-1,3 hydrocarbon and acrylonitrile. No. 2,482,600. B. F. Goodrich Co.

**Increasing the plasticity of elastomeric compositions** by disseminating in an elastoprene selected from the group consisting of natural rubber, butadiene and alkyl-substituted butadiene polymers and copolymers of a conjugated diolefin hydrocarbon with styrene and acrylonitrile, 0.05-5.0% by weight of the elastroprene of phenylthiosalicylate and subjecting the mixture to a temperature above 90° C. for a sufficient time to induce the desired plasficity. No. 2,483,984. American Cyanamid Co.

**Treating a synthetic rubber latex** comprising an aqueous emulsion polymerizate of a mixture of butadiene-1,3 with a compound which contains a single $CH_2{=}C<$ group where at least one of the disconnected valances is attached to a group which increases the polar character of the molecule and which compound is copolymerizable with butadiene-1,3 to increase the average particle size of said synthetic rubber latex which comprises adding aqueous solution of acetone. No. 2,484,425. U. S. Rubber Co.

**Making sponge rubber** from synthetic rubber latices and mixtures of natural rubber latex with such synthetic rubber latex, which comprises whipping into a foam such a latex containing not more than 0.5% of ammonia, 2 to 10% of zinc oxide, and 0.3 to 5% of a zinc sequestering agent of the group consisting of alkali carbonates, borates, phosphates, sulfites, oxalates, ferrocyanides, ferricyanides and chromates, thereafter adding a gelling agent to the latex foam, shaping the foam before gelling takes place, permitting the foam to gel, and vulcanizing to form sponge rubber. No. 2,484,434. U. S. Rubber Co.

**Heat-curable synthetic elastic product** containing as an elastic element thereof a solid, elastic, curable methyl- and phenylpolysiloxane. No. 2,484,595. General Electric Co.

**Rubber** tackified with acylated phenol-aldehyde resin. No. 2,485,097. United States Rubber Co.

**Rubber-like material** comprising the emulsion polymerization product of para methyl alpha methyl styrene and butadiene-1,3. No. 2,485,273. Standard Oil Development Co.

**Producing high molecular weight rubbery polymers** by copolymerizing isobutylene and isoprene in the presence of a dissolved Friedel-Crafts catalyst. No. 2,485,335. Standard Oil Development Co.

## *Specialties*

**Inhibited phosphoric acid solution** against corrosion of ferrous metals containing 4-methyl-2-hydroxy quinoline. No. 2,482,104. Frank E. Dolian.

**Flexible smooth-surface floor covering** comprising cottonseed pitch, gilsonite, sulphur, drier for said pitch, powdered limestone, and filler other than said powdered limestone. No. 2,482,185. Congoleum-Nairn, Inc.

**Bituminous composition of improved adhesive power** which consists of a bitumen having incorporated therein a complex compound of a polyvalent metal chloride and an organic dyestuff containing a basic group selected from the group consisting of methylene blue hydrochloride, rhodamine hydrochloride and malachite green hydrochloride. No. 2,482,331. Standard Oil Development Co.

**Homogeneous, storage-stable solution** in an essentially hydrocarbon medium of a corrosion-inhibiting amount of a partial ester of an acyclic polyhydric alcohol an aliphatic acid having from 10 to 40 carbon atoms, said solution additionally containing an oil-soluble salt of an organic sulfonic acid in an amount sufficient to maintain the ester in solution under normal storage conditions as a corrosion inhibiting composition. No. 2,482,517. Shell Development Co.

**Flux** containing the following oxides; i.e., ZnO; $SiO_2$; $B_2O_3$; $Li_2O$; CaO; $Na_2O$. No. 2,482,533. B. F. Drakenfeld & Co., Inc.

**Non-separating liquid buffing composition** consisting of a free-flowing water solution of an amine salt of a higher fatty acid, said salt being substantially non-volatile under buffing conditions, the ratio of water to said salt being not more than about 10:1, and an abrasive, said abrasive being permanently suspended in said solution. No. 2,482,667. Oneida Ltd.

**Solution for reducing the light reflective characteristics of an article treated thereby** consisting of a silicic acid alkyl ester selected from the group consisting of tetraethylorthosilicate, tetramethylorthosilicate and mixtures thereof, a strong mineral acid, with water miscible readily volatile organic solvent. No. 2,482,684. American Optical Co.

**In producing a complex of acid and nitrogen with fibrous cellulose or protein** to impart durable flame-resistance, the method of forming said complex by impregnating with an aqueous solution of the reaction product of a water soluble inorganic acid compound selected from the class consisting of acids of phosphorus and sulfur which are free of metal and of organic groups and of constituents yielding active oxygen and halogen and which are substantially non-volatile under the conditions of the process, and metal-free salts of such acid compounds decomposable, and the anion of which is volatile, under the conditions of the process, to yield the acid, and at least one non-metallic organic compound basic in the acid solution and soluble therein and which contains nitrogen and has an atomic ratio of carbon to nitrogen not substantially more than the ratio of carbon to nitrogen in acetamide. No. 2,482,755. Joseph Bancroft & Sons Co.

**In producing a complex of acid and nitrogen with cellulose fibrous materials** to impart durable flame and mildew resistance, impregnating the fibrous material with an aqueous solution of at least one water soluble inorganic acid compound selected from the class consisting of acids of phosphorus and sulfur which are free of metal and of organic groups and of constituents yielding active oxygen or halogen and which are substantially non-volatile under the conditions of the process and metal-free salts of such acid compounds decomposable, and the anion of which is volatile, under the conditions of the process, to yield the acid, at least one non-metallic organic compound basic in the acid solution and soluble therein and which contains nitrogen and has an atomic ratio of carbon to nitrogen not substantially more than the ratio of carbon to nitrogen in biuret, a water soluble volatile alkaline compound in an amount sufficient to give to the solution a pH of from 6 to 8, and an aldehyde compound chosen from the class consisting of formaldehyde, hexamethylene tetramine, acetaldehyde, and glyoxal. No. 2,482,756. Joseph Bancroft & Sons Co.

**Aqueous wax emulsion** for treating rubber stock consisting essentially of emulsifiable solids, water-soluble emulsifying agent, water and a natural resin solution in which the emulsifiable solids comprise material selected from the group consisting of aluminum, calcium, magnesium and zinc stearate, a vegetable wax, paraffin and a delustring agent selected from the group consisting of stearyl alcohol and hydrogenated castor oil, and water. No. 2,483,259. S. C. Johnson & Son, Inc.

**Composition of matter** comprising tobacco having appreciable moisture content and containing a small amount of alpha-methylglycerine. No. 2,483,418. Publicker Industries Inc.

**Bookbinding material** to which animal glue will adhere tenaciously which comprises a film of polyvinyl chloride and a surface sizing coat of a composition containing a copolymer of vinyl chloride, vinyl acetate and an alpha beta olefinic unsaturated carboxylic acid. No. 2,483,465. E. I. du Pont de Nemours & Co.

**Making a wax composition** by mixing a wax, a rosin-maleic anhydride-glycerine resin, and oleic acid, heating and stirring to blend the mass into a homogenous mixture, adjusting the temperature, adding monoethanolamine, adding water, stirring until the solids are completely emulsified, and adding water and cooling. No. 2,483,701. Diversey Corp.

**Quick-breaking oil-in-water type emulsion** consisting of water, a water-insoluble, water-dispersible, organic, thermoplastic, resinous substance emulsified therein, and a small amount of a preformed alkali metal ammonium chromate salt to promote adhesion of the emulsified substance to hydrophilic aggregate. No. 2,483,835. Stancal Asphalt & Bitumuls Co.

**Liquid composition** for depositing a corrosion inhibiting film upon metal surfaces consisting of an unctuous solvent and a corrosion inhibiting salt of a dehydrogenated rosin amine and a saturated fatty acid. No. 2,484,010. Hercules Powder Co.

**Normally tacky pressure-sensitive adhesive mass** for coating on a porous, fibrous tape backing comprising polyisobutylene, factice as a modifier for the polyisobutylene, tackifying resin, plasticizer, and inert reinforcing filler. No. 2,484,060. Johnson & Johnson.

**Adhesive tape and composition thereof** consisting of a polyamide of the type formed by the reaction of polymeric fat acids of the drying and semi-drying oils with a diamino-amine, with a substance selected from the group consisting of polyvalent metallic salts of fatty acids and monoamides of fatty acids. No. 2,484,416. Kendall Co.

**A chewing gum base** comprising a solution of a water soluble sweet 1-alkoxy-2-amino-4-nitrobenzene in a masticatory hydrocarbon. No. 2,484,859. Walter O. Snelling.

**A chewing gum base** comprising a masticatory hydrocarbon and a 1-halogeno-2-amino-4-nitrobenzene dissolved in the hydrocarbon. No. 2,484,860. Walter O. Snelling.

**Pressure-sensitive adhesive tape** having a coating of a stably tacky eucohesive varnish-oil-base rubberless pressure-sensitive adhesive reaction product formed from a bodied varnish oil, a compatible zinc-resinate tackifier resin and a sulfur vulcanizing agent and an oil-soluble heat-reactive phenolaldehyde resin. No. 2,484,938. Minnesota Mining & Mfg. Co.

**Pressure-sensitive adhesive sheet** comprising a flexible backing having one side coated with an ethylene/vinyl acetate copolymer, said copolymer having admixed therewith about 0.05 to 0.25 part by weight of octadecandiol diacetate as a tackifier. No. 2,485,248. E. I. du Pont de Nemours & Co.

**Inhibiting corrosion of ferrous metal** in contact with an aqueous fluid containing hydrogen sulphide by incorporating in the aqueous fluid a methylol melamine condensation product capable of being colloidally suspended in said aqueous fluid. No. 2,485,309. Standard Oil Development Co.

**Rust inhibitor** containing asphaltic bitumen, fixed oil, and waxy hydrocarbon. No. 2,485,321. Shell Development Co.

**Composition** consisting of a mineral lubricating oil base containing dissolved a member of the class consisting of sorbitan mono-oleate and pentaerythritol mono-oleate, and a member of the class consisting of tributyl phosphite and tri-p-tert.-butylphenyl phosphite. No. 2,485,341. Standard Oil Development Co.

**Corrosion-resisting lubricating compositions** consisting of a diester of a saturated aliphatic dicarboxylic acid of 6 to 10 carbon atoms and an aliphatic monohydric alcohol of 4 to 14 carbon atoms in which there is dissolved an oil-soluble petroleum sulfonate and an oil-soluble alkylphenoxypolyethoxyethanol having an alkyl group of 4 to 12 carbon atoms and having 3 to 5 ether linkages. No. 2,485,376. Rohm & Haas Co.

**Inhibiting foaming in steam boilers** by dispersing into water a substance selected from the group consisting of castor oil and castor oil esterified at its hydroxyl groups with a fatty acid containing at least 16 carbon atoms, together with a fatty acid ester-amide of a hydroxyl alkyl amine, said fatty acid containing at least 12 carbon atoms. No. 2,485,378. Dearborn Chemical Co.

## *Textiles*

**Increasing the wear resistance of wool** comprising the steps of distributing on the surface of wool fibers a treating agent having the formula, $R{-}X{=}C{=}Y$, wherein R is an alkyl group having a chain length of at least ten carbon atoms, X is a member of the group consisting of C and N, and Y is a member of the group consisting of O, S, and $NR'$ where R' is a member of the group consisting of hydrogen and monovalent hydrocarbon radicals. No. 2,482,578. Arthur D. Little, Inc.

**Preparing semi-stiff collars** which are highly resistant to repeated launderings which comprises applying a composition containing approximately equal parts of a water soluble polyvinyl alcohol and a water soluble urea-formaldehyde condensate to an interlining fabric. No. 2,483,130. Imperial Chemical Industries Ltd.

**Production of basic linear polyamides**, by heat reacting a polyamine containing two and only two primary amino groups and at least one secondary amino group and whose primary amino groups are its sole reacting groups, the primary amino groups being separated from each secondary amino groups present by at least 2 atoms with a substantially equimolecular quantity of oxalic ester until a fiber-forming polymer is produced. No. 2,483,513. Celanese Corp. of America.

**Bonding a rubber** to a fibrous cellulosic textile material by contacting the cellulosic material with a material of the group consisting of an aqueous emulsion of a primary rosin amine, an aqueous solution of a primary rosin amine acetate, an aqueous solution of a primary rosin amine hydrochloride and an aqueous solution of a primary rosin amine hydrobromide. No. 2,485,136. Hercules Powder Co.



PERIODICAL PRESS CORP., PHILA., PA.

# NOW···for the first time

# Anhydrous NITRIC ACID

**Commercially Available in Drums or Tank Cars!**

***...Another General Chemical Achievement in "Basic Chemicals for American Industry"***

From its earliest pioneering developments with the ammonia oxidation process, General Chemical has been recognized for its uniformly high quality grades of Nitric Acid—in any desired strength—for any industrial need.

**Facts about**
**General Chemical ANHYDROUS NITRIC ACID**

Light yellow color
Absorbs moisture from atmosphere
Violently reactive oxidizing agent
Powerful nitrating agent
Safely shipped and stored in standard aluminum containers

**Other Grades of General Chemical Nitric Acid Include:**

Standard: 36°, 38°, 40° and 42° Baume
Diamond*: 36°, 38°, 40° and 42° Baume
Photo Engravers': 36°, 38°, 40° and 42° Baume
Nitric Acid 95% (48.5° Be), Diamond and Standard
Reagent, A.C.S., Sp. Gr. 1.42
Fuming, Reagent, A.C.S. and Technical, Sp. Gr. 1.49-1.50
Red Fuming, Reagent, and Technical, Sp. Gr. 1.59-1.60

Now, the company has reached the ultimate in Nitric production with the development of an absolutely anhydrous material for new, exacting requirements. To maintain the anhydrous quality, the product contains a small amount of Nitrogen Pentoxide, $N_2O_5$, (the true anhydride of nitric acid) which stabilizes against absorption of water during storage.

This anhydrous material has many of the desirable properties of red fuming nitric acid with additional favorable characteristics for certain uses. It is available in 55 gallon drums or tank cars. Further information may be obtained from any General Chemical office listed below.

BASIC CHEMICALS

FOR AMERICAN INDUSTRY


**GENERAL CHEMICAL DIVISION**
ALLIED CHEMICAL & DYE CORPORATION
**40 Rector Street, New York 6, N. Y.**

*Offices:* Albany • Atlanta • Baltimore • Birmingham • Boston • Bridgeport Buffalo • Charlotte • Chicago • Cleveland • Denver • Detroit • Houston Kansas City • Los Angeles • Minneapolis • New York • Philadelphia Pittsburgh • Portland (Ore.) • Providence • San Francisco • Seattle St. Louis • Wenatchee and Yakima (Wash.)

In Wisconsin: General Chemical Company, Inc., Milwaukee, Wis.

**In Canada:** The Nichols Chemical Company, Limited • Montreal • Toronto • Vancouver

# *You know that* **WITCO** *makes highest quality products*

## *...AND HERE IS WHERE WITCO MAKES THEM*

Witco manufactures its basic materials for industry in seven well-equipped plants . . . stretching from New Jersey to deep in the heart of Texas. The quality of these products is rigidly controlled by Witco's skilled technicians in three modern research laboratories. Prompt deliveries are assured by a nationwide chain of strategically located Witco warehouses.

Stearates are made in Witco's plants at New York and Chicago. Plants in Perth Amboy, New Jersey, Chicago and Lawrenceville, Illinois, produce Witco Asphalts and Asphalt Specialties. A new unit in Chicago makes driers and other organic chemicals. Witco's facilities at Eunice, New Mexico, Sunray and Big Lake, Texas produce their particular types of quality Channel and Furnace Blacks.

Witco's technical service staff is ready to serve you at all times. Technical data and samples of Witco products are yours for the asking.

*YOU KNOW THAT WITCO MAKES HIGHEST QUALITY PRODUCTS*

*Check your requirements against these WITCO products:*

**METALLIC STEARATES**
**ASPHALT**
**PAINT DRIERS**
**ASPHALTIC MASTICS**
**CARBON BLACKS**

# **WITCO** *Chemical Company*

295 Madison Ave., N. Y. 17, N. Y.

Los Angeles • Boston • Chicago • Detroit
Cleveland • San Francisco • Akron
London and Manchester, England